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Report of The Royal Commission of Inquiry into The Testing and Marketing of Liquor in Ontario

The Honourable Mr. Justice
John H. Osler
Supreme Court of Ontario
Commissioner

Ontario

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Ontario

The Royal Commission of Inquiry into the Testing and Marketing of Liquor in Ontario

Commission royale d'enquête sur l'analyse et la commercialisation des alcools en Ontario

The Honourable Mr. Justice John H. Osler
Commissioner

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The Honourable Lincoln M. Alexander,
Lieutenant Governor of Ontario,
Room 131, Legislative Building,
Queen's Park,
TORONTO, Ontario.
M7A 1A1

Your Honour:

I have the honour to submit herewith the final report of the Royal Commission on the testing and marketing of liquor by the Liquor Control Board of Ontario.

It was hoped that the report could be submitted to your Honour in both official languages. To my regret, time constraints have worked against this aim. I have decided it is in the public interest that the Report be submitted without the delay translation would require.

Respectfully submitted,

J.H. Osler
Commissioner.

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Ontario
Executive Council

Order in Council

On the recommendation of the undersigned, the Lieutenant Governor, by and with the advice and concurrence of the Executive Council, orders that

WHEREAS the Government of Ontario is concerned whether the practices of the Liquor Control Board of Ontario (the "L.C.B.O.") in testing liquors as defined by the Liquor Licence Act, in deciding whether to provide the public with information relating thereto and deciding whether to permit the sales of liquors to the public have been in the best interests of the public;

AND WHEREAS there are concerns respecting the public information and marketing practices of the L.C.B.O. since 1975 for those liquors;

AND WHEREAS it is considered desirable to cause an inquiry to be made under the Public Inquiries Act, R.S.O. 1980 c. 411 concerning these matters which are matters of public concern;

AND WHEREAS the inquiry is not regulated by any special law;

THEREFORE pursuant to the Public Inquiries Act a commission be issued to appoint The Honourable Mr. Justice Osler a commissioner to conduct the inquiry and who is to:

(1) inquire into, determine and report on the general practice of the L.C.B.O. since 1975 in testing liquors for substances which ought not be present in liquor for health or other reasons, including when tests are conducted and what tests are conducted;

(2) inquire into, determine and report on the general practice of the L.C.B.O. since 1975 when substances are found in liquors which ought not be

......2

present in liquor for health or other reasons, including the internal reporting procedures in the L.C.B.O., reporting to Government officials, reporting to the public and deciding whether to permit the sale of the subject liquor, how that practice was developed, and whether the L.C.B.O. ever made exceptions to that practice;

(3) inquire into, determine and report on any incidents since 1975 wherein the L.C.B.O. found substances in liquors which ought not be present for health or other reasons and what steps were taken at the L.C.B.O. in those cases;

(4) recommend any changes which ought to be made at the L.C.B.O. in testing procedures and in procedures to be followed upon finding substances in liquors which ought not be present for health or other reasons;

(5) inquire into, determine and report on the circumstances surrounding any finding since 1975 of ethyl carbamate in liquors sold by the L.C.B.O. and the information and marketing practices of the L.C.B.O. with respect to those liquors;

(6) inquire into, determine and report on the circumstances since 1975 surrounding any monitoring of ethyl carbamate in liquors sold by the L.C.B.O. and any steps taken at the L.C.B.O. in relation thereto;

(7) inquire into, determine and report on the circumstances since 1975 surrounding any finding

......3

of diethylene glycol in liquors sold by the L.C.B.O., and the information and marketing practices of the L.C.B.O. with respect thereto;

(8) inquire into, determine on an interim basis and report as soon as possible, on a permissible level of ethyl carbamate in liquors and then to further inquire into, determine and finally report on a permissible level of ethyl carbamate in liquors, provided that no standard for a permissible level is set by a federal authority prior to the interim or final reports required hereby; and

(9) inquire into, determine and report on any directions given to Ontario and foreign liquor manufacturers with respect to eliminating ethyl carbamate or other substances from liquors and any steps taken by such manufacturers or the L.C.B.O. as a result;

AND THAT all Government Ministries, Boards, Agencies and Commissions shall assist the Commissioner to the fullest extent in order that he may carry out his duties and functions, and that he shall have authority to engage such counsel, expert technical advisors, investigators and other staff as he deems it proper, at rates of remuneration and reimbursement to be approved by the Management Board of Cabinet;

AND THAT the Ministry of the Attorney General will be responsible for providing administrative support to the inquiry;

.......4

AND THAT Part III of the said Public Inquiries Act be declared to apply to the aforementioned inquiry.

Recommended
Minister of
Consumer and
Commercial Relations

Concurred Caplan
Chairman

Approved and Ordered November 20, 1985
Date
Lieutenant Governor

Certified to be a true copy.

Assistant Clerk, Executive Council

ACKNOWLEDGEMENTS

The Commission held public hearings on 32 days. It heard 43 witnesses, several of them more than once. In addition, it heard submissions from six individuals and organizations. Although the concerns of certain of the latter group went beyond the Commission's terms of reference, they were designed to be of assistance and I acknowledge them with thanks.

Several of the major wineries were represented by counsel, who participated fully in the hearings and made submissions on some of the issues. All were helpful and the Commission wishes to acknowledge their assistance.

David Wilcox, Vice-President, Products Division, was assigned by the Chairman of the L.C.B.O., John Ackroyd, to respond to the various inquiries of the Commission's officers, and to assist in the production of documents. He was present throughout the hearings and, together with Barry A. Percival, Q.C., counsel for the Board, he was of much help to the Commission and its counsel.

I acknowledge with gratitude the work of my counsel, Clay M. Powell, Q.C. and Barbara Bogoch. Mr. Powell's long experience with the Crown, as well as his work as defence counsel, fitted him ideally for this Inquiry. Mrs. Bogoch was so effective as research counsel that she was promoted to associate at an early stage. Between them, they led the evidence and succeeded in making even the technical material comprehensible to me. I am grateful to them both.

The work of our investigator, the late Detective Inspector Roy Stroud, of the Ontario Provincial Police, was invaluable to counsel and to me. His death by accident during the course of the Commission's proceedings was a sad blow for us all.

I would be remiss if I did not acknowledge the courtesy and patience displayed by Allan Parker, Director of the L.C.B.O. laboratory, and by members of his staff, towards counsel during their visits to the lab and their persistent inquiries.

Our secretarial needs were ably looked after by Helen Warburton with the assistance of Carol McKinnon and, for a short time, Maria Gaetano. Steven Clarke helped with many tasks in and out of the office.

Thomas B. Millar, retired Local Registrar of the Supreme Court of Ontario, is wise in the ways of Commissions and of government departments. He was our administrator and Registrar and greatly lightened the burden for counsel and for me.

Finally, I am grateful to my secretary, Mrs. Barbara Hogg, who painstakingly and cheerfully produced this report with her usual skill.

LIST OF WITNESSES APPEARING BEFORE THE INQUIRY

NAME	DATE APPEARED	POSITION HELD AT TIME OF HEARINGS OR RELEVANT TIME
ACKROYD, John Wesley	Jan. 30 and May 15, 1986	Chairman, L.C.B.O.
ANDERSON, Clair John	May 14, 1986	Quality Control Co-ordinator, L.C.B.O.
ANDERSON, William R.	Apr. 2, 1986	Chief Oenologist, Jordan & Ste-Michelle Cellars Ltd.
ARNOLD, Edward Simon	Apr. 1, 1986	President, T.G. Bright & Co.Ltd.
ASPLER, Tony	May 15, 1986	Wine Writer
BEAUMIER, Dr. Pierre	Feb. 13, 1986	Vice-President, Mann Testing Laboratories
BECK, Sylvia	Feb. 12, 1986	Secretary, Private Stock, L.C.B.O.
BOLES, Eric William	Apr. 2, 1986	Quality Control Manager, Jordan & Ste-Michelle Cellars Ltd.
BOSWORTH, William John	Jan. 29, 1986	Former Chairman, L.C.B.O.
CHUDYK, Dr. Richard	May 14, 1986	Chief Scientist, Horticultural Research Institute of Ontario
CLARKE, Albert Percival	Jan. 27 and May 20, 1986	Former Chief Chemist, L.C.B.O.
COUILLARD, John Kenneth	Mar. 25, 1986	Former Assistant General Manager, Products Division, L.C.B.O.
DISTON, David George	Apr. 1, 1986	Vice-President, T.G. Bright & Co.Ltd.

LIST OF WITNESSES APPEARING BEFORE THE INQUIRY

NAME	DATE APPEARED	POSITION HELD AT TIME OF HEARINGS OR RELEVANT TIME
FLETT, Ronald John	Jan 28 Feb. 4 Apr. 10 and May 15, 1986	Vice-President, Products Division, L.C.B.O.
FRENCH, David Edward	May 14, 1986	Cost Accounting Clerk, L.C.B.O.
GHETTI, John Joseph	Apr. 1, 1986	Viticultural Manager, T.G. Bright & Co.Ltd.
GRACE, Brian	Feb. 12, 1986	Supervisor, Private Stock, L.C.B.O.
GRAS, Hernan	Apr. 1, 1986	Wine Master, T.G. Bright & Co.Ltd.
HARTLEY, Anne D.	Feb. 4 Apr. 10 and May 13, 1986	Director, Product Administration, L.C.B.O.
JACKMAN, Donald Harvey	May 12, 1986	Executive Vice-President, Operations, L.C.B.O.
KARUMANCHIRI, Alexander	Jan. 22-24 Feb. 12 and Apr. 10, 1986	Research Scientist, L.C.B.O.
KEMENY, Dr. Tibor	Dec. 9, 1985	Scientific Advisor, Health Protection Branch, Ottawa
KIRKPATRICK, Diana C.	Dec. 9, 1985 Apr. 10, 1986	Director, Bureau of Chemical Safety, Health Protection Branch, Ottawa
LAYTON, Christopher	Mar. 26, 1986	Communications Officer, L.C.B.O.

LIST OF WITNESSES APPEARING BEFORE THE INQUIRY

NAME	DATE APPEARED	POSITION HELD AT TIME OF HEARINGS OR RELEVANT TIME
MACDONALD, John Arthur	Jan. 30 and May 13, 1986	Supervisor of Vintages, L.C.B.O.
MacINNIS, Frank Alan	Jan. 21, 1986	Executive Vice-President, Administration, L.C.B.O.
MAHONEY, James	Jan. 21 and Apr. 10, 1986	Legal Counsel, L.C.B.O.
MARGOLIS, Eric	May 12, 1986	Freelance Journalist
NICOL, David George	Apr. 1, 1986	Quality Control Manager, T.G. Bright & Co. Ltd.
NOBLE, John Edward	Mar. 26, 1986	Vice-President, Finance, L.C.B.O.
OPDAM, Nicholas J.	Apr. 3, 1986	Director of Oenology, Barnes Wines Ltd.
PARKER, Edgar Allan	Jan. 29-30 Feb. 3- 4 Apr. 9 May 12-13 and 21, 1986	Director, Laboratory, L.C.B.O.
PODSTATZKY, Frank	Feb. 12, 1986	Agent, Featherstone & Company
POAG, Barry William	Apr. 3, 1986	Winemaker, Andres Wines Ltd.
RYLKO, Richard Ralph	Apr. 3, 1986	Vice-President, Jordan & Ste-Michelle Cellars Ltd.
SHAND, Charles Brock	Feb. 5, 1986	Supervisor, Winery Audit, L.C.B.O.

LIST OF WITNESSES APPEARING BEFORE THE INQUIRY

NAME	DATE APPEARED	POSITION HELD AT TIME OF HEARINGS OR RELEVANT TIME
SHARP, Andrew Peter	May 14, 1986	Wine Expert
SING GEN, Desmond A.	Apr. 2, 1986	Technical Services Co-ordinator, Jordan & Ste-Michelle Cellars Ltd.
SMITH, Dr. Lesbia	Dec. 9, 1985	Senior Medical Consultant, Environmental Health Toxicology, Ontario Ministry of Health
TACCOGNA, Marguerite	Feb. 13, 1986	Secretary, Laboratory, L.C.B.O.
WILCOX, David Francis	Mar. 26 and May 20, 1986	Vice-President, Products Division, L.C.B.O.
YAN, Joseph	Jan. 29, 1986	Chemist, L.C.B.O.
ZIMMERMAN, Josef	Apr. 2 -3, 1986	National Manager, Wine Production, Jordan & Ste-Michelle Cellars Ltd.

THE BOARD

The Liquor Control Board of Ontario in its present form owes its existence to the Liquor Control Act of 1975 but to determine certain of its powers and scope reference must also be made to the Liquor Licence Act of 1975, now R.S.O. 1980, Chapter 244.

The sections of the respective statutes which are of particular importance to this Inquiry are set out below.

Liquor Control Act

> 1. In this Act,
>
> (a) "beer", "liquor", "spirits", "wine" and "Ontario wine" have the same meaning as in the Liquor Licence Act.
>
> ...
>
> 2. (1) The Liquor Control Board of Ontario is continued and shall consist of not more than five members appointed by the Lieutenant Governor in Council.
>
> ...
>
> (3) The Lieutenant Governor in Council shall designate one of the members to be Chairman of the Board and may designate one of the members to be Vice-Chairman of the Board.
>
> ...
>
> 3. The purposes of the Board are, and it has power,
>
> (a) to buy, import and have in its possession for sale, and to sell, liquor and other products containing alcohol and non-alcoholic beverages;

(b) to control the sale, transportation and delivery of liquor;

(c) to make provision for the maintenance of warehouses for liquor and to control the keeping in and delivery from any such warehouses;

(d) to establish government stores for the sale of liquor to the public;

. . .

(h) to determine the classes, varieties and brands of liquor to be kept for sale at government stores and maintain standards therefor;

(i) to fix the prices at which the various classes, varieties and brands of liquor are to be sold and, except in the case of liquor sold through an outlet designated by the Minister of National Revenue under the Excise Act (Canada) as a duty free sales outlet, such prices shall be the same at all government stores;

(j) to determine the nature, form and capacity of all packages to be used for containing liquor to be kept or sold;

. . .

(m) to require manufacturers of liquor to furnish such samples of their products to the Board as the Board may require;

(n) to do all things necessary for the management and operation of the Board in the conduct of its business.

4. (1) The Chairman shall preside at all meetings of the Board, or, in his absence, or if the office of Chairman is vacant, the Vice-Chairman has all the powers and shall perform all the duties of the Chairman.

(2) The Chairman shall be the chief executive of the Board and shall devote his full time to the work of the Board, and the other members shall devote such time as is necessary for the due performance of their duties as members of the Board.

. . .

(5) The Board is a corporation to which the Corporations Act does not apply.

5. (1) All expenses incurred and expenditures made by the Board in the conduct of its affairs shall be paid out of the revenues of the Board.

(2) The net profits of the Board shall be paid into the Consolidated Revenue Fund at such times and in such manner as the Lieutenant Governor in Council may direct.

. . .

(4) The Board shall submit to the Treasurer of Ontario, at such times as he may prescribe, reports setting out the net profit and net profit forecasts of the Board and such reports shall contain such information as he may prescribe.

Liquor Licence Act

1. In this Act,

(a) "alcohol" means a product of fermentation or distillation of grains, fruits or other agricultural products rectified once or more than once whatever may be the origin thereof, and includes synthetic ethyl alcohol;

(b) "beer" means any beverage containing alcohol in a proportion that is greater than that prescribed by the regulations obtained by the fermentation of an infusion or decoction of barley, malt and hops or of any similar products in drinkable water;

...

(f) "liquor" means spirits, wine and beer or any combination thereof and includes any alcohol in a form appropriate for human consumption as a beverage alone or in combination with any other matter;

...

(j) "Ontario wine" means,

(i) wine produced from grapes, cherries, apples or other fruits grown in Ontario or the concentrated juice thereof, and includes Ontario wine to which has been added herbs, water, honey, sugar or the distillate of Ontario wine or of cereal grains grown in Ontario, or

(ii) wine produced by the alcoholic fermentation of Ontario honey with or without the addition of caramel, natural botanical flavours or the distillate of Ontario honey wine;

. . .

(n) "spirits" means any beverage that contains alcohol obtained by distillation;

. . .

(p) "wine" means any beverage containing alcohol in a proportion that is greater than that prescribed by the regulations obtained by the fermentation of the natural sugar contents of fruits, including grapes, apples and other agricultural products containing sugar, and including honey and milk.

Without reviewing in detail the statutory authorization, it may be noted generally that liquor may not be imported or sold in Ontario except under the aegis of the Board. Exceptions to this general statement are beer, which the Board may authorize to be sold by the brewers or by their marketing agency and wine which the Board may authorize to be sold by domestic manufacturers in their own stores. Even in these cases, however, the Board requires products to be submitted to it for testing and approval for sale.

For all practical purposes, therefore, it may be said that the Board has a complete monopoly over the importation and sale to the public of all alcoholic beverages. Its privileges and responsibilities must be viewed in the light of this fact.

At the relevant times, internal workings of the Board were governed in part by a series of by-laws, the most important of which for the purposes of this Inquiry were numbers 1 and 2. By-law No. 1 enacted April 5, 1976, established the Executive Directors' Committee composed of five members and chaired by the Chairman of the Board. Its purposes were very broadly to determine the proper procedures and requirements of the Corporation for its effective administration under the Act.

By-law No. 2 established the Listings Committee, commonly referred to as the Listing Committee, composed of twelve members, again chaired by the Chairman of the Board. Its purposes and duties were "to analyze, review, consider, approve or reject all new offerings of products presented to the Board for listing," to approve the delisting of products that did not meet with the Board's sales quotas or, for other reasons, to review, revise and establish quota systems, to supervise the purchasing of liquor and supplies, to approve or reject requests for "brand switches or substitutions", to determine the size of containers and to review quotations from time to time and to list or delist products.

At the relevant times, the Listings Committee met twice annually to consider new submissions for listings and in addition it met every four to six weeks to consider requests for brand substitutions and changes of a minor nature. New listings for domestic products were also considered at these interim meetings.

It should be added that the Executive Directors' Committee met approximately once each week.

Some slight idea of the scope of the Board's oeprations may be gathered from the fact that it is usual for well over 500 applications to be dealt with at the main listing meetings, twice in each year.

The period during which the events concerning this Commission occurred corresponded with a period of considerable growth by the Board. The 59th Report of the Board covering the period ended March 31, 1985, indicates gross sales of beverage alcohol in 1983 of $1,467,296,000, in 1984 $1,504,738,000, and in 1985 $1,599,337,000, and at the close of 1985 the Board remitted to the Treasurer of Ontario, as net income for the period, the sum of $604,282,000, representing 37.8% of its gross sales.

During the same three-year period the number of employees declined from 3,476 to 3,412. The number of regular products listed by the Board for sale was 2,347 at the close of 1983, and 2,527 at the close of 1985.

In addition to the Board's own sales, it had general supervision over the operations of stores maintained by Ontario wineries with sales amounting to $42,879,151 and the operations of breweries and Brewers Retail Stores which had sales of $1,119,288,929.

THE LABORATORY

In addition to the 3,412 full-time employees as of March 31, 1985, the Board employed 2,161 temporary employees for a total of 5,573. Of this very large workforce a total of nine were employed in the Board's laboratory. Figures supplied to the Commission by the Board and filed as Exhibit 99, as explained by Mr. John E. Noble, Vice-President, Finance, indicate that the Board's expenses represented by the Laboratory, i.e., operating expenses plus capital expenditures for equipment, have in the past seven years ranged between $266,000 and $475,000. In all the years from 1979 to 1985, excluding 1983 and 1984, years in which the Board had especially high capital expenditures, the proportion of expenses for which the lab was responsible ranged between .22% and .26%. The expenses charged to the laboratory in the same years represented between .063% and .079% of profit and between .024% and .029% of sales.

At a later stage it will be seen that some reorganization has been made and more is contemplated for the laboratory and that it is to play an expanded role in exercising the Board's mandate in future. At this stage I state at once that whatever may be said about its management, all the evidence impels me to the conclusion that the Board has an efficient and dedicated laboratory staff, at least the equal of any comparable organization of which the Commission has heard. Members of the Federal and Provincial Departments of Health, although not asked about such matters in detail, had no criticism to make of the lab's personnel, systems or results. Dr. Pierre Beaumier, Chief Chemist and Vice-President of the Mann Testing Laboratories, the only Canadian laboratory that could be found when confirmation of the Ethyl Carbamate testing in the L.C.B.O. lab was sought, now makes use of the methods used by Mr. Karumanchiri and is quite satisfied with them. Further, it became apparent in the course of the Inquiry that when testing for Ethyl Carbamate became an issue no laboratory in Canada and perhaps in North America had better or even equal facilities or methods for such testing.

From the little we learned of government testing facilities in the United States, it would appear that nothing superior to the L.C.B.O. lab exists and the amount of testing conducted by government agencies charged with similar duties is far smaller than the amount routinely performed in the L.C.B.O. lab.

We were advised by one witness, knowledgeable in the ways of wineries around the world, that the L.C.B.O. lab, the gateway through which any product designed for what is said to be the world's largest single purchaser of beverage alcohol must pass, is considered by European suppliers to be very tough and to maintain high standards.

The Ontario wineries whose representatives gave evidence before us indicated that they had respect for the L.C.B.O. lab and were satisfied with their dealings with it.

It is interesting to note that when the presence of Diethylene Glycol in certain European wines first attracted attention, the Report of the General Accounting Office of the United States Government, Resources Community and Economic Development Division, filed as Exhibit 170, states that one of the earliest sources of information reaching the United States authorities was Canada. With the exception of one or two quantitative values discussed, no question was raised before this Commission, by any manufacturer or supplier, consumer or government authority regarding the efficiency, appropriateness or accuracy of the work of the laboratory.

While the Commission will indicate later in this Report that the relative isolation of the laboratory and what are now seen to have been inadequate communication procedures played a major part in whatever went wrong, the L.C.B.O. is fortunate in having an organization with such high standards in its midst; its small size and its small budget probably did nothing to bring home to middle and senior managers the importance of quality control generally and laboratory testing in particular.

The establishment of the laboratory as an integral part of the L.C.B.O. occurred around the year 1950. Albert Percival William Clarke, former Chief Chemist, who retired on September 30, 1982, was hired by the L.C.B.O. in 1947. At that time the Board had no lab facilities of its own and Clarke was actually working in the Department of Health at Queen's Park. Up to that date, the lab had been doing all the testing that was done for the Board and Mr. Clarke's arrival brought the number of personnel up to a total of three.

At that time some 400 or 500 analyses were performed annually, testing chiefly for alcohols, extracts, ash, volatile acids and sugar.

In about 1950 the then General Manager of the Board decided to build a laboratory in one of the existing warehouses of the Board on Wellington Street. Those premises sufficed for approximately five years when a move was made to a building on Lakeshore Boulevard, and in 1957 a new facility was constructed, essentially the laboratory that exists today.

Mr. Clarke was responsible for almost all the details of the layout in his role as Assistant Chief Chemist under a Mr. Bonham. In approximately 1962 Mr. Clarke became Chief Chemist having under him a total staff of four including a laboratory cleaning person.

In the earliest days, testing of products imported in bulk and bottled by the Board was carried out and all samples submitted for new listings were tested, but once listed, products were not routinely tested again, although some might be examined from time to time, apparently on a random basis.

It is important to appreciate that testing was then carried on, and is now carried on, with respect to two separate sets of standards. The first, which generally relate directly to the health of the consumer, consists of those substances which may potentially be found in wine or other liquors and which are not on the permitted list of additives established by the regulations under the Food and Drugs Act. It may at once be stated that the form which regulation by the federal authority has taken presents some dificulties to any person deciding what substances need to be monitored. In effect, anything not specifically permitted is prohibited as an additive and some that are permitted are regulated as to the proportion in which they may be found. There is also a direct prohibition against selling wine containing more than 0.13% by volume of volatile acidity calculated as acetic acid. As it was put by Mr. Clarke in his second appearance before the Commission, "Well, the federal Food and Drug Act and the Food and Drug Regulations are the legal basis for testing and whenever a federal standard was set then the Board, at least the laboratory felt that they were in a legal position to reject anything that exceeded that federal limit on a legal basis after confirmation. Like, if we found it high and we confirmed it by another method or by an outside laboratory, then we felt we were in a legal position to reject it."

A second set of standards, or norms, had to do with the quality of liquors, especially wines, and these had little or nothing to do with health and safety. As Mr. Clarke put it, "However, another function of the laboratory is quality control and although a substance may not exceed a legal standard, it may occur in a sample either undesirable or an abnormal level." [sic]

Those quality control standards and in fact all tests other than those required to meet the standards of the Federal Food and Drugs Act were established by Mr. Clarke when he was Chief Chemist.

Mr. Clarke testified that to establish norms, a control chart method based on pamphlets issued by the American Society for Testing Materials was used and that this is a statistical method. It would involve analyzing many samples of a particular type of product, calculating the averages, and the standard deviation, and then, on the basis of mathematics set out in the pamphlet, warning limits and rejection limits would be set. Referred to Exhibit 126, wherein guidelines are set out for the composition of beers, spirits and liqueurs, and wines, Mr. Clarke asserted that he had been involved in establishing those standards.

Clarke acknowledged that among other resources he had checked when establishing standards was the set of norms established by the Quebec Liquor Control Board. Mr. Parker's opinion was that the standards had in fact been simply lifted from the Quebec list and upon examination they appeared to be almost, if not entirely, identical.

As testing became standardized, the various substances and components for which tests were made were listed upon index cards so that results could be kept in a consistent form. Mr. Clarke testified that as norms were established, guideline sheets were handed to the industry, mailed to some of the wineries and given to the agents of other wineries.

In the past, when applications for listings, and hence sale through the L.C.B.O., were received, certain documentation would be prepared and the submissions would be placed before the Listing Committee. The Listing Committee had certain commercial considerations to consider as well as labelling requirements established by the Department of Consumer and Corporate Affairs in Ottawa and the likelihood that sufficient sales would be generated to make it worthwhile to carry the product. While details change from time to time, it has been the policy of the Government of Ontario to encourage and assist the Ontario wine industry in various ways and hence the Listing Committee has always accepted a much greater proportion of Ontario domestic applications than of those from other applicants.

If a product was accepted in principle by the Listing Committee, it was necessary to have the product tested and approved by the laboratory before final acceptance. Prior to April 24, 1979, every new product submission for which samples were received would be referred to the laboratory for testing. By reason of the increased number of applications and the heavy workload, the policy was changed so that only products conditionally approved by the Listing Committee were sent to the laboratory for testing.

There were from time to time differences in the order in which these things were done. Mrs. Anne Hartley, Director of Product Administration, Liquor Control Board of Ontario since 1984, and now responsible for Product Listings/ Quality Control, testified that new Listing Applications received from domestic producers are considered at the interim meetings of the Listing Committee and, depending upon how far in advance of the meeting the applications are received, they may proceed first to the laboratory and then to the Committee or the reverse order may be followed. In the case of foreign applications, considered only at the twice yearly major meetings, they are screened initially by members of Mrs. Hartley's Department, the survivors are placed before the Listing Committee, and those that are accepted in principle are then referred to the laboratory. The term "laboratory" in this connection refers both to a tasting panel which does exactly what the name implies and establishes a qualitative reading, subjectively arrived at, and the laboratory proper in which scientific testing is carried out for the safety criteria and the quality norms referred to previously.

In either case, when a product is accepted "in principle" by the Listing Committee, it is Mrs. Hartley's practice to write a form letter to the applicant advising that the submission has been accepted and instructing them how to prepare to ship their product to the Board. If a product has been approved subject to lab approval, this reservation is not communicated to the applicant. Mrs. Hartley's testimony was that this practice is well known and accepted in the industry and has caused no difficulty.

However, should the lab report to the Product Control Division that it has been unable to approve a product, on a quality or safety basis, Mrs. Hartley stated that "We will let the winery or distillery or whoever know what the problem is and say, you know, forward us other samples, and the same with lab analysis. If it has failed the lab because of a sedimentation problem or because of a little bit of volatile acidity or any of the normal run of the mill problems that we come up with, we inform the supplier. They are aware of that, and they go ahead and forward new samples."

The routine was supposed to provide that Mrs. Hartley's office would do the necessary follow up and co-ordination and either send on an application with a favourable lab report to the Listing Committee or send on a Listing Committee Report with a conditional acceptance to the laboratory and tasting panel and in almost all cases this is what occurred. No steps could be taken by the ordering or receiving sections until both approvals had been obtained. Exceptions however did occur, as will be seen at a later stage.

So far as new listings are concerned, there were two exceptions to the rule that lab acceptance was a condition precedent to ordering. In the case of what used to be known as the Rare Wines Store, the manager of that department, and his buyers, sometimes placed orders for very small quantities of highly prized wines or sometimes bought such wines direct at auctions. In the case of such purchases from established producers, worldwide, quantities were generally small and conditions such that to insist on prepurchase testing was not considered practical. Such wines could therefore find themselves on the shelves of the Rare Wines Store untested, and later, when the department was expanded, they could be displayed in "Vintages", the name given to the small stores or boutiques in which such wines, aiming at the consumer who was knowledgeable, were offered for sale.

The second category consisted of private stock wine and beer products ordered in less than 50-case lots. It was, and is, possible for a consumer, whether an hotelier or restauranteur or private customer, to place an order through the L.C.B.O. for a product not listed by the Board which the applicant wished to obtain. The assumption was made that in less than 50-case lots, the product was not generally being imported for resale but rather for private consumption, and testing was not done.

So far as products already listed and available on the shelves of L.C.B.O. stores are concerned, bottles are drawn on a regular basis both from winery stores and from the shelves of various L.C.B.O. stores and submitted to regular testing. Normally, if problems are found with such products, the manufacturers are contacted directly by the laboratory personnel and corrective action taken.

No routine channel appears to have been established for reporting problems with either the health standards or the quality standards of products tested to higher levels of management and particularly to the Executive Directors' Committee. Mr. Mahoney, Legal Counsel to the Board, testified that his office was immediately adjacent to that of Mr. Bosworth, Chairman during most of the relevant period and up until July 1984. He indicated that in most cases when a serious problem arose and was brought to the attention of the Chairman he generally informed Mahoney and requested his advice without delay. Where policy decisions were required, Mahoney either advised Mr. Bosworth or had the matter immediately put on the agenda for the next meeting of the Executive Directors' Committee. Both that Committee and the Listing Committee were chaired by Mr. Bosworth and each had Mr. Mahoney as a member. There was no evidence before me that any serious matter concerning the acceptability of a product for health or for quality reasons was ever placed before or came to the attention of either committee until after the Ethyl Carbamate problem had become public knowledge. In all the testimony and all the documentation before the Commission there is nothing to suggest that anyone brought such a problem before them.

Perhaps by addressing paragraph (3) of the Commission's Terms of Reference and examining incidents wherein the L.C.B.O. found substances in liquors which ought not to be present, a clearer picture of the general practice and the reporting procedures in the L.C.B.O. may emerge.

SPECIFIC FINDINGS BY THE LABORATORY

Leaving aside the Ethyl Carbamate problem, there follows a review of the incidents that emerged in the course of the Inquiry and the action taken in each case. In the course of such review, something may be said regarding the policies and actions of the Health Protection Branch of the Department of Health and Welfare, Canada. Any inquiry into the affairs of that Department is, of course, beyond the scope of this Inquiry. Nevertheless, it is impossible to examine the L.C.B.O. and particularly the operations of its laboratory in isolation and without reference to its relationship to the senior government.

The first substance with respect to which a problem arose was Methanol in a plum brandy purchased from Yugoslavia, known as Navip Slivovitz. Methanol is a synonym for methyl alcohol, sometimes called wood alcohol, usually denoted on L.C.B.O. laboratory cards by the symbol MeOH. It is a poisonous substance and poisoning may occur from ingestion, inhalation or absorption through the skin. It may lead to headache, visual impairment or complete blindness, convulsions, circulatory or respiratory failure or death, and death from ingestion of less than 30 ml. has been reported. Chronic use of small quantities may lead to visual impairment.

In spite of the toxicity of this substance, the Commission's staff found on investigation and inquiry from the Bureau of Chemical Safety, Food Directorate, Health Protection Branch, Department of Health and Welfare, Canada that the federal authority has not established a maximum safe level for Methanol, although the Commission has been advised that it is their intention to do so in the near future. However, following discussion between Clarke, then head of the laboratory, and federal authorities in earlier years, it was decided to adopt what appears to be the standard of the European community, namely, a limit of .35% in brandy. Clarke established this as an L.C.B.O. norm although he treated it as having the authority of a regulation of the Federal Food and Drug Department. Interestingly enough, the United States Food and Drug Administration appears to have an "administrative guideline" No. 7401.01 which cites a 30-year old policy regarding methyl alcohol limitations. It is stated that domestically produced brandies rarely exceed 0.1% by volume and that imports can approach 1.0% by volume. "Policy is that any brandy exceeding 0.35% by volume methyl alcohol will be considered 'adulterated' under U.S. F.D.A. regulations. Also, high methyl content cannot be remedied by dilution of the 'adulterated brandy'."

On February 13, 1979, some 600 cases of the plum brandy were ordered and early in May 800 actually arrived. A sample was tested by the laboratory on May 30th and found to contain Methanol at 0.43%, exceeding the L.C.B.O. norm of 0.35%.

There is no indication that the results of the analysis were communicated to anyone outside the laboratory and it appears from other documents that the shipment was warehoused and distributed to the various L.C.B.O. outlets in the same manner as would a product that had been accepted.

On July 31, 1979, 875 cases of this same plum brandy were ordered and arrived on October 26, 1979. This shipment was again tested and found to contain 0.43% of Methanol. The test result was forwarded to Mr. Couillard, at that time Assistant General Manager, Stock Purchasing and Product Control, with a copy to Mr. Galichon, Director of Product Control. The report was marked as "rejected" and Mr. Clarke had typed on the Defective Stock Report the comment "wood (methyl) alcohol content exceeds the maximum permitted level for distilled spirits." In ink was written "875 C/S on hand" and we were advised that C/S stands for "cases". On December 12, 1979, Mr. Galichon forwarded to Gyaki Agencies in Toronto, the local agent for the manufacturers, a copy of the lab finding, including all the typed portion, and he added, "Will you kindly take note and make the necessary arrangements with your supplying company to have the fault, as indicated, corrected on all new and future orders."

It may be noted that the Defective Stock Report form has two spaces to be checked, "warning" and "rejected" and that the latter space had been checked.

On March 3, 1980, Mr. Galichon sent another sample to Mr. Clarke which was also found to contain 0.43% methyl alcohol. On March 6, 1980, Mr. Clarke advised Mr. Galichon that the sample was rejected. The following day Mr. Flett sent a sample to Mr. Clarke for analysis. On March 10, 1980, Mr. Clarke advised Mr. Flett that the methyl alcohol exceeded legal limits and "the shipment is rejected." On March 14, 1980, Mr. Galichon again advised the agent by the same form letter of the laboratory's findings.

Notwithstanding these reports, by April 1980 all of the 875 cases had been distributed through the system and gone out to the stores for sale and, as indicated above, there is no evidence to indicate that the previous 800 cases were not also sold.

Finally, another sample was tested on or about June 2, 1980, and the Methanol was down to 0.23% alcohol, an acceptable level.

It should be stated that, while the reporting memorandum from Mr. Clarke dated November 27, 1979, was addressed to Couillard, in his appearance on the witness stand Couillard was not asked about this episode. The Defective Stock Report indicates the routine, however, and the subsequent letters to the agent indicate that the reports at least reached Mr. Galichon, the Director of Product Control. Although it concerned a dangerous substance, 875 cases of this Slivovitz were permitted to be distributed and sold to the public and these in all likelihood followed an earlier 800 cases.

Prior to May in 1980, apparently during a routine inspection, the lab found that an Italian red wine, Drepano, contained high levels of Cyanide. Little evidence was available about this episode but the discovery appears to have been made on a routine check and there is no evidence that the product was ever distributed.

In cases of defective products which are deemed to be unsaleable, the producer is given the alternative of having the product destroyed or having it returned, in either case at the producer's expense. In this case, ultimately the entire shipment was returned to the shipper in Italy and correspondence indicates a pledge on the part of the shipper to apply very strict controls "by using your analysis methods."

Although the evidence is skimpy, it appears that the routine was adequate, the danger was spotted and the product was not placed on sale. There is no evidence that the discovery of Cyanide in this wine was communicated to the public or to any other authority. Speculation as to the disposition of this contaminated wine by the maker is beyond the scope of this Inquiry and would be fruitless.

On January 16, 1981, R.J. Flett, then Assistant Director, Product Listings and Control, wrote to an importer's agent in Toronto advising him that the L.C.B.O. had determined an upper level of 2 parts per billion (ppb) for Nitrosamines (N-Nitrosodi-methylamine) and that a complete survey of all imported beers as well as domestically produced beers revealed that the only one exceeding the level was McEwan's

Strong Ale, a product imported by the agency. It was indicated that lab analysis showed a level varying between 3.2 and 4 ppb for the product.

Mr. Flett went on as follows:

> It is our understanding that the level of Nitrosamines can be controlled by altering the malting process.
>
> I request that you communicate this information to your supplier so that future shipments of McEwan's Strong Ale contain fewer than 2 ppb."

In his testimony, Mr. Flett indicated that "a good portion of this letter in fact was supplied by the laboratory because I didn't even know what Nitrosamines, I didn't know half the words in there so they obviously drafted a good portion of this for me."

There is no evidence that the product was removed from the shelves or that any further action was taken.

The episode is of interest for two reasons. First, the discovery that Nitrosamines were present in this beer was made in the course of a survey of all beers handled by the L.C.B.O., apparently as the result of a flurry of media reports indicating the presence of those substances in some foods, particularly bacon. It was apparently decided to make the survey and for this purpose a new gas chromatograph equipped with a Hall Detector was used. As explained by Mr. Karumanchiri, the Hall Detector is an extremely sensitive instrument and it can be made specific for different elements present in organic chemicals. Karumanchiri converted the Hall Detector so as to make it nitrogen specific, which is to say that it would detect only organic compounds containing nitrogen. Both Dimethyl Nitrosamine, which is the substance for which the analysis was being made, and Ethyl Carbamate contain nitrogen and it was a by-product of the search for the Nitrosamine that the discovery was made that Ethyl Carbamate was present in a number of alcoholic products.

The other fact of significance is that Mr. Flett's letter indicates that the laboratory was apparently notifying the Product Control Department of results obtained. Flett's evidence is silent as to how this information was conveyed to the Product Control Department or how the decision to warn the supplier, but not reject the product, was reached. At another point in his evidence, Flett discusses conversations he believed he had with Parker, then Director of the Laboratory, as to how distinctions were to be communicated between defects that were undesirable and defects that were dangerous. The discrepancies between his evidence and that of Parker will be discussed below.

On September 29, 1983, tasting room personnel discovered that there was some grazing and chipping of the glass at the neck of a bottle of an imported wine known as Magic Flute. The discovery was immediately reported to the Product Control Department and all warehouses were notified forthwith to put the shipment on hold.

In the presence of the local agent a random selection of bottles were opened and it became apparent that the problem was occurring with several of them. On September 30th a circular went out to all stores over the signature of Mr. Flett, at that time Director, Product Listings and Control, advising them to withdraw from sale all stock on their shelves originating with the shipment concerned. The memorandum is slightly confusing as it advises managers they may sell from another shipment but at the same time states that it was impossible to differentiate one shipment from the other by inspecting the labels and therefore that all shelf stock was to be withdrawn.

The laboratory examined some 27 bottles from each of two different shipments, one older than the shipment originally discovered to be defective, and found that one shipment was free of glass and impact marks and that six of the bottles taken from the other shipment had glass on the cork and showed impact marks on the lip of the bottle. The wine in one of those bottles was filtered and upon examination by microscope several particles of glass were found in the filter.

Ultimately, the Board advised the shipper that the problem appeared to be an imperfect meet between certain bottles and the corking machine and that the two defective shipments would not be accepted for sale.

In the end, the supplier requested that sufficient cases to fill one shipping container be returned and the balance were destroyed at the stores or warehouses where they were found.

While the defective product was withdrawn from sale, no effort was made to inform the consuming public that some bottles which had been sold from the stores might contain glass fragments and be a health hazard. It is apparent, therefore, that prompt and thorough action was taken to discover the limits of the problem detected with this wine and it was immediately withdrawn from sale. However, no attempt was made to warn consumers who might have the product at home. Anne Hartley, now Director of Product Administration, expressed the opinion in the course of her testimony that, in the light of subsequent developments with other substances, she would now think it proper in such a case to notify the general public so that those who had already purchased the product would have an opportunity to learn of the defect and the danger.

On July 30, 1984, a memorandum from Parker, Director of the lab, to Flett, Director, Product Listings and Control, indicated that two cases of a brand of Polish Vodka had been examined and that two bottles from one case showed chipping at the top as did four bottles from the second.

Parker suggested that, as there was a possibility of glass entering the product, store stocks should be withdrawn from sale.

All stocks appear to have come from this one shipment and stores were immediately notified to withdraw the product from the shelves and the warehouses were told to put their stocks on hold.

Subsequently, after negotiations with the supplier, the Board agreed to purchase the stock at a discount and, after filtering it, to add it to its own stock of alcohol.

Again, action was taken promptly when the problem was discovered. While there is no documentation, it appears that the tests were made as a result of complaints received from individual store managers. There were apparently no problems of communication. Once more, however, the consuming public was not notified and any members who had already purchased this product were left in ignorance of their danger.

The next episode concerned Methanol once more and, again, Slivovitz, this time a Hungarian Slivovitz which was noted as "sealed by the orthodox Rabbinat of Budapest" and described as kosher for Passover. It would appear that the request for listing as a rare wine was dated and, according to the agent, brought to the L.C.B.O. on approximately October 7, 1983. The date stamp on the back of the request indicates it was received in the laboratory on September 17, 1984. According to Mr. Macdonald, in charge of the Vintages Operation, the reason for the delay was that at that time the Board was "...having, shall we say, a little quality control problem with Hungary in general and Hungary, generally speaking, was persona non grata, so we didn't bother tasting the product until well into '84."

The original request for listing, filed as the first page of Exhibit 154, bears the signature of Mr. Parker and his comments as well as check marks on the form. His comments were as follows: "Exceeds upper limit for Methanol. Copper pollution is at the upper limit of the L.C.B.O. norms. Alcohol contents are apparently declared in U.S. measure. Alcohol found 43.17%--declared U.S. proof 94 equals 47 ALC/VOL--this variation is unacceptable."

On the laboratory section of the report check marks are placed indicating that the product contravenes the Federal Food and Drugs Act, that it contravenes the Liquor Control Act of Ontario and that it is not acceptable for listing.

Mr. Parker indicated that the normal procedure was for him to write upon the original, as he did, and then for his secretary to type on another copy exactly what Mr. Parker had written and return a copy to the requisite section of the Product Control Department.

The original index card prepared in the laboratory by Mr. Karumanchiri was filed with the Commission, indicating clearly enough that Methanol was found in the proportion of 0.57% by volume and that this had been rechecked, that copper was at 0.92% and that the alcohol, claimed 94 proof (equivalent to 47%), was in fact 43.1% as found.

Curiously enough, on September 18th, which could not have been later than one day following the receipt of the listing application in the laboratory, an order for 50 cases was placed by Mr. Flett, the Director of Product Listings and Control, no doubt acting on the request of Mr. Macdonald.

Receipt of the copy of the letter was acknowledged to our investigator by the agent and on June 17, 1985, a purchase order went out and the shipment arrived on October 3, 1985.

Another curious piece of this episode is that an employee named Randi Landy, who did not join the Board until April 1985, had stroked through a copy of the letter of September 18, 1984, ordering the product and written on that copy the word "cancelled." No explanation was offered for this. Finally, on the copy of the request for listing which had been noted by Mr. Parker it appears that the box "rejected" had been checked by the grading panel rather than the box "accepted".

Thus it appears highly probable that Mr. Flett's letter ordering this product went out before the laboratory report was received, as the testimony was that testing generally took from three to four weeks, and indeed no person who gave testimony or who was interviewed by the Commission staff had any recollection of having received the laboratory report.

Mr. Macdonald, having described the routine that is now followed, stated at page 4351 of his evidence that:

> Now, that's what we do now. In fact, in these days, we were basically very new at this, myself and I have an assistant--well, sort of assistant--advisor with me and basically I was put in charge of this end of the operation and it was quite a new thing for me and there is a lot of confusion and so on at that time of setting this thing up.

> I was the only person doing it. Business was literally growing very, very rapidly and there were times when there were mistakes made. I'm not saying, you know, I was aware of this one, but there were times when we even ran into double orders where we were ordering the thing twice when we should have only ordered it once.
>
> It took until late '84, the beginning of '85 before we really got ourselves into a procedural thing where nowadays, we see something like Methanol, definitely there is no--I should say there's no action taken on the product before we get a lab report back. We don't even database the product before then.

There is voluminous documentation about this order as the supplier in Hungary changed his agent, the price was changed, the packaging was not what the L.C.B.O. had understood and in general it took until October 3, 1985, until the product arrived.

No further test appears to have been scheduled but shortly thereafter the Ethyl Carbamate problem became public knowledge and, in the course of testing a great variety of products, this kosher Slivovitz was tested, found to contain 2,692 ppb of Ethyl Carbamate and was therefore put on hold.

On April 17, 1986, a bottle from this shipment was tested again by the L.C.B.O. lab and found to contain 0.77% Methanol. The agent was never advised of the Methanol problem. It appears highly likely that if the Ethyl Carbamate problem had not arisen, this product would have been displayed and sold in the Vintages stores and the consuming public exposed to a Methanol level more than twice that agreed upon by the federal and provincial authorities as the safe upper limit.

There is no evidence and no reason to believe that there was a deliberate attempt on the part of anyone, supplier, agent or L.C.B.O. employee, to place this product on sale improperly or to endanger the health of the consuming public. As counsel for the L.C.B.O. put it, this one seems to have "slipped through the cracks" and somehow not been caught by a procedure designed to do that very thing. While technically there may not have been a breach of a regulation under the Food and Drugs Act, both federal and provincial authorities were of the opinion that a ceiling for Methanol had been set at .35%. This is a very dangerous substance and it was only good fortune that resulted in the consuming public not being placed at risk.

In November and December 1984 and January 1985 three cases occurred in which Armagnacs, proposed for the Rare Wines Store, were analyzed by the lab, found to contain copper in excess of the L.C.B.O. norm, marked as not acceptable by the laboratory, but accepted by the tasting panel and ordered nevertheless.

In one case, the copper was recorded as 1.90 parts per million (ppm), in the second 2.28 ppm and in the third 1.5 ppm.

There is no federal regulation governing copper, but the L.C.B.O. norm is 1 part per million.

Mr. Macdonald, at that time in charge of the Rare Wines operation, testified that in his view something like 2 parts per million would be more realistic and that in each of these cases, as the tasting panel found no defect resulting from the excess copper, he placed the order.

There was no discussion with Parker regarding the acceptance or otherwise of the advice he tendered, but there was discussion with the tasting panel about the quality of these products.

Mr. Macdonald indicated that there are considerable differences of opinion about copper, worldwide, and that standards seemed to vary from approximately 1 part per million to 5 ppm.

In none of these three cases was the agent advised of the excess copper finding, nor was the supplier.

As no upper limits for copper have been set under the Food and Drugs Act, it is probably safe for the Commission to assume that excess copper presents no acute health hazard. On the other hand, there would seem to be little point in establishing L.C.B.O. norms if those responsible for placing the orders are free to disregard them when advised that they have been exceeded. It would seem that a case can be made for the proposition that deviations affecting only quality may be more acceptable when the orders are placed for distribution only among Rare Wines or Vintages stores, as here, or when the orders are for private stock. Nevertheless, it is the view of the Commission that no product found by the laboratory to violate L.C.B.O. norms and recommended for rejection should be approved unless with the deliberate endorsement of a knowledgeable person of at least vice-presidential rank.

On October 4, 1984, an agent applied for a Rare Wines listing for a product known as Santa Claus Beer, made in Switzerland. On January 7, 1985, the beer was tested and the alcohol content was found to be 14.1%. The lab report was checked by Mr. Parker to indicate that the product was not a beer (according to F & D regulations), that it contravened the federal Food and Drugs Act, that it contravened the Liquor Control Act of Ontario and that it was not acceptable for listing.

Two hundred and fifty cases of the beer were ordered and in addition 50 cases of a dark beer by the same maker, which product does not appear to have been tested. Both types arrived on April 12, 1985, and were sold. The agents were not informed of any problem.

This was described by Mr. Parker as not being a beer, the reason being that by definition under the Food and Drugs Act a beer shall not contain more than 5.5% alcohol by volume and an additional regulation specified that malt liquor is not to exceed 8.5%.

Mr. Macdonald in his testimony expressed the view that this product is special, brewed on only one day of the year, and marketed throughout the world as a beer. He therefore disregarded Mr. Parker's rejection and, through Mrs. Hartley, placed the orders.

This episode deserves special comment only because the regulations pertaining to beer, which were infringed in this case, were those that the Supreme Court of Canada had declared to be ultra vires the Canadian Parliament in the case mentioned in another section of this Report. Technically, there may have been no regulation whatever in force or capable of being violated. Neverthless, the incident is an illustration of the same problem as was referred to above, namely, under what circumstances the listing or marketing departments should be free to disregard the recommendation of the laboratory, if ever.

If the only deviation from the norm was in fact a high alcohol content, it is probably correct to say that no question of health or safety was involved. On the other hand, members of a consuming public accustomed to drinking beer with an alcohol content of approximately 5% might encounter some quite surprising results upon unknowingly drinking a product containing more than 14% alcohol by volume.

On two occasions early in 1985 an agent applied for acceptance of a red French wine known as Chinon les Picasses. On the first occasion, the application was made for admission as private stock and a sample was sent to the laboratory for analysis. Mr. Parker reported that the volatile acidity was 0.22% and the total acidity 0.55% and that "the wine is very cloudy and with excessive volatile acidity." The application was marked "not acceptable" and noted that another bottle was required for re-analysis.

The grading panel report was checked as "rejected", the reason given being the lab report, and the decision marked as approved by Mr. Flett who by that time had become Vice-President, Products Division.

The volatile acidity levels are .104% for the L.C.B.O. norm and .13% pursuant to the Food and Drugs Act.

On February 14, 1985, the agent applied for the same product for a listing in Vintages. This time the volatile acidity was found to be 0.14%, and the lab report, signed by Mr. Parker, shows that the product contravenes the Food and Drugs Act and the Liquor Control Act of Ontario and is not acceptable for listing. It is noted that "volatile acidity exceeds both federal and provincial limits. Another bottle is required for re-analysis of volatile acid."

The grading panel report in this case is checked as "accepted" and, on April 22nd, an order for 50 cases was placed by Mr. Macdonald. A purchase order followed on July 15th.

Mr. Macdonald said he submitted the wine to the panel of tasters and, as they felt it was acceptable, he was not concerned about the contravention of provincial and federal regulations.

Mr. Parker testified that he was not aware that the same wine had been submitted both to Vintages and private stock and that in one case his report was acted upon whereas in the other it was disregarded. Macdonald stated that he did not know about the private stock submission either but only about that submitted to Vintages.

The local agent did not testify before the Commission but did inform Commission counsel that she had in fact submitted a second sample for analysis and that it had been "clear".

Although there is a volatile acidity standard under the Food and Drugs Act, it appears that the question of volatile acidity relates at least as much to quality as it does to health or safety. Some wines with a tendency toward excess sweetness are improved by a high level of volatile acidity.

As in other respects, it may be that both federal regulations and provincial norms should be revised. However, the case does illustrate first, that lack of communication can result in mistakes, and second, that once again the Vintages authority, in the person of Mr. Macdonald, has overridden a laboratory recommendation.

On March 22, 1985, a sample of Spanish red wine submitted for testing as a Rare Wines' purchase showed a reading of 0.108% volatile acidity and was noted by the laboratory as contravening the Liquor Control Act, not acceptable for listing, and another sample was requested for re-analysis.

Notwithstanding that report, on April 23rd, 200 cases were ordered, the purchase order went forward on June 5th, and the product arrived on September 4, 1985.

Here again, the product was accepted by the tasting panel and ordered by Mr. Macdonald and the wine was sold without notice to agent or manufacturer that there was anything unsatisfactory about it. Again, a case of disregarding technical quality standards and the question of the review of such standards presents itself.

In point of time, the next episode concerned Diethylene Glycol and commenced in July of 1985. Because of the very specific instructions the Commission received regarding this substance, it will be dealt with subsequently.

Meanwhile, one of the innovative things proposed by Mr. Karumanchiri and approved by Mr. Parker, and ultimately by the Budget Committee, was a somewhat complicated test for three pesticides, including that known as Mesurol. In 1984, considerable interest had been shown by the media in the subject of pesticides and the possible contamination of food and beverages. Mesurol, also known as Methiocarb, is a Carbamate insecticide and bird repellant. It is not registered as a permitted substance in Canada. The general rule laid down by the Federal Health Authority is that a concentration of 0.1 parts per million (ppm) is the highest proportion of a non-permitted insecticide that will be tolerated in Canada.

In the course of routine testing, Mr. Karumanchiri found Mesurol at a level of 0.46 ppm in a New Zealand wine found on the shelves of the L.C.B.O. The test, or rather the screening process, through which this finding had been made was a somewhat complicated one ,and for this reason, as well as because it is good scientific practice, the Health Protection Branch was requested to confirm this finding. In due course, it did so with a finding of almost the same concentration as had been found by the L.C.B.O. lab.

Immediately upon confirmation, Mr. Karumanchiri, acting for Mr. Parker who was absent at the time, made a report to Mrs. Hartley, in charge of Product Listings and Control, on a regular "Defective Stock Report" in accordance with Board routine. On the same day, the Inventory Control Department was notified to put the product on "hold", meaning it was not to be shipped out and this instruction promptly went to all the warehouses. The laboratory was then instructed to test all shipments, in the event that more than one shipment of this product was in stock, and within a very few days all stores were notified to remove the product from the shelves.

Ultimately, the product was not returned to the shelves and was in fact destroyed.

As an interesting aside, in the course of correspondence with the manufacturer, the agent and the Office of the High Commissioner for New Zealand, the suggestion was made that the stocks be turned over to the High Commissioner's office where it could be used for diplomatic receptions. The Board refused this request.

This episode is of interest for two reasons. First, it indicates pioneering work on the part of the laboratory. It also is an example of a system then in place that moved smoothly and resulted in the removal of the product from sale and the protection of the public. Third, it illustrates a situation in which Canada stands possibly alone, and certainly not with the majority of wine producing countries, in banning the use of Mesurol. The recommendation of the World Health Authority is for a much higher level to be permitted and in Austria, Germany, Australia and New Zealand in particular, reasonably high levels are permitted. The matter of international consultation will be touched upon in the Commission's recommendations.

The disquieting thing about the episode is that a delay of several weeks intervened before confirmation was obtained from the Health Protection Branch of the Federal Department of Health and action taken to stop sale of the product. As will be seen later, steps have now been taken to minimize or eliminate this delay in the case of substances suspected to be seriously threatening to health or life.

ETHYL CARBAMATE

It will be useful to an understanding of some of the events that gave rise to this Inquiry to examine very briefly the history of Ethyl Carbamate, frequently herein referred to as E.C., as it relates to the affairs of winemakers who manufacture in the Province of Ontario.

For purposes of the layman, urethane is synonymous with Ethyl Carbamate and it may be that the terms will sometimes be used interchangeably in this Report. Under either name it is a chemical compound which is now known to appear in nature in certain substances at trace levels. The term "trace level" is taken to mean detectable but not measureable by current methods of analysis. Ethyl Carbamate is also formed when urea is exposed to alcohol in the presence of heat, and it now appears that this latter fact is the most frequent and indeed the most likely cause of its appearance in fermented products made from alcohol.

The Food and Drugs Act, R.S.C. 1970, Chapter F27 defines "food" as including "any article manufactured, sold or represented for use as food or drink for man, chewing gum, and any ingredient that may be mixed with food for any purpose whatever." Under that Act, regulations provide that certain additives may be used in the production of certain food. If a substance is not listed as a permitted additive, it may not be used as an additive in the preparation of food or, more specifically, wine.

In the fermentation of wine, yeast is used and winemakers at some times and in some circumstances have felt the need of an additive to increase the action of the yeast. Urea has sometimes been so employed and it is a permitted additive under the Food and Drugs Act Regulations.

From approximately 1964 until February of 1974, John Kenneth Couillard held the position of General Manager and Secretary Treasurer of the Canadian Wine Institute. The function of that institute was largely to represent the interests of Canadian winemakers, initially those in Ontario but subsequently those in British Columbia as well, with the Liquor Control Boards and Commissions and various federal departments across Canada.

In testifying before the Commission, Mr. Couillard acknowledged a notice sent to members of the Canadian Wine Institute on January 13, 1965, over his signature, advising of a meeting of the Quality Standards and Grape Growing Committee of the Canadian Wine Institute which was being held on January 21, 1965. Among the purposes of the meeting as listed on the notice was an item numbered 3, "To Discuss the Use of Diethyl Pyrocarbonate (DEPC)." Mr. Couillard testified that the wineries at that time wanted to use DEPC as a preservative in the production of wine, but it was not provided for in the federal Food and Drugs Act Regulations. At about the time of the meeting mentioned above, "steps were taken to ask the Federal Government to approve the use of DEPC and include it in the standards for winemaking", and this was done. The substance was approved.

Mr. Couillard was, therefore, familiar with the substance Diethyl Pyrocarbonate as early as 1965.

In approximately December 1971, the Health Protection Branch of the Department of Health and Welfare, responsible for the administration of the Food and Drugs Act, received the detailed results of a Swedish study indicating that Diethyl Pyrocarbonate used in wines produced Ethyl Carbamate, a substance which was a known carcinogen for all the animals with respect to which it had been tried, and was considered as a potential carcinogen for humans. As the analytical methods of the time did not permit the precise measurement of the amount of Ethyl Carbamate found in a given substance, the solution reached by the Department of Health and Welfare was to ban the use of Diethyl Pyrocarbonate completely. The mechanics proposed for producing this result were that DEPC, generally known by the trade name of Baycovin, would be removed from the list of permitted additives, thereby bringing it under the general prohibition of additives to food under the statute.

Mr. Couillard was still occupying the position of General Manager and Secretary-Treasurer of the Canadian Wine Institute and he was requested by a Mr. Read of the Health Protection Branch to inquire among the winemakers as to whether they would object to having Baycovin removed from the list of permitted substances. The formal result of the inquiry was that on January 21, 1972, Couillard, for the Institute, responded in the form of a request that the Federal Government delist Baycovin from the Food and Drugs Act Regulations.

It is obvious from the evidence of Couillard and from the evidence of Mrs. Kirkpatrick as to the way in which the Department conducts its business that the initiative for the delisting came from the Department and that it was anxious to obtain the consent of the wineries to the proposed action. Putting that consent in the form of a request for action was a satisfactory way of showing that the subsequent action of the Department in delisting the substance was a consensual act so far as the wineries were concerned.

In view of what happened at a later time when the probable presence of Ethyl Carbamate in products being marketed by the L.C.B.O., of which he was then Assistant General Manager, Products Division, was detected, it is important to note that the evidence of Couillard, as well as that of other employees of the L.C.B.O., establishes beyond question that Couillard knew that the reason for delisting Baycovin was the fact that its use brought about the production of Ethyl Carbamate. Ethyl Carbamate was a known carcinogen, so far as animals are concerned, and this too was known to Mr. Couillard. He testified that because of his experience in 1972 with the delisting process he was aware of the fact that Ethyl Carbamate was "a mild carcinogen." He testified that his informant in the Federal Food and Drug Directorate stated that "they had identified it as a possible or a mild carcinogen...and they really wanted it out of the section, the standards for wine."

The evidence of Mrs. Diana Kirkpatrick, now the Director of the Bureau of Chemical Safety, was that in the early seventies it was extremely rare to refer to a carcinogen as anything else but that. She thought it most unlikely that anybody would refer to a carcinogen as a mild carcinogen and that normally if there were found to be carcinogens in test animals "they were deemed to be potentially human carcinogens until such time as data became available which showed otherwise."

Ethyl Carbamate is in fact now thought to be a wide spectrum carcinogen, meaning that it does not produce tumors merely in one specific part of the body but on many different sites. In Mrs. Kirkpatrick's view, in the light of present knowledge, Ethyl Carbamate would be looked on as somewhere in the mid-range between low toxicity and high toxicity. Dr. Tibor Kemeny, Toxicologist in the Federal Department of Health and Welfare, considers that "it is basically at the lower end of the scale" and "not considered to be too highly carcinogenic..." At any rate, the fact that Ethyl Carbamate was found where DEPC was used was the sole reason for delisting the latter as a permitted additive in the production of wine, and this fact was known to Mr. Couillard at all times relevant to this Inquiry. The letter to Couillard advising that DEPC would be delisted was dated February 7, 1972 (Exhibit 136), and the Order in Council effecting the delisting was passed shortly thereafter.

Alexander Thomas Karumanchiri was employed by the Liquor Control Board in 1968. He had obtained a Bachelor of Science Degree in India and he obtained further academic training and practical experience at Gutenberg University in Mainz, West Germany. He has had courses in organic, inorganic and physical chemistry, mathematics and physics and practical training in crystallography, chromatography, micro analysis and analytical chemistry.

Upon his employment by the L.C.B.O. he set up the chromatography section of the laboratory. During his employment he has kept himself current with developments in the field by taking courses in chromatography and spectroscopy. He has developed or modified a substantial number of analytical methods and procedures.

In the course of his studies, he heard of Ethyl Carbamate in relation to carbamic acid. He then heard of it with respect to alcoholic beverages in 1972 when the report was circulated concerning the presence of Ethyl Carbamate in wine treated with DEPC and the latter (Baycovin) was banned.

Albert Percival William Clarke, whose degrees included that of Master of Arts in Biochemistry, joined the Liquor Control Board in 1947, working at first in the laboratory of the Department of Health at Queen's Park. He was employed in various facilities until in 1957 the L.C.B.O. constructed a new lab facility at its present location, very largely designed by Mr. Clarke who was then Assistant Chief Chemist. He became Chief Chemist in 1962 or 1963.

Through the literature and because of its delisting by the federal authorities, Clarke was familiar with DEPC and with the allegation that Ethyl Carbamate was one of its by-products. In his view, DEPC had been a popular preservative amongst the winemakers. Karumanchiri and Clarke agree that in late 1977 or early 1978, the subject of preservatives arose during a coffee break. Since the banning of DEPC the lab had been routinely screening samples for residues of Diethyl Carbonate, a breakdown product of Baycovin, in order to determine whether any of the manufacturers were using the illegal preservative.

Clarke instructed Karumanchiri to see if he could develop a method for testing DEPC to see if Ethyl Carbamate was actually produced. A method involving gas chromatography and confirmation by mass spectography had been described in the literature and had apparently been used in the United States. Mr. Karumanchiri adapted this method to the equipment used by the L.C.B.O. but as the L.C.B.O. at that time had no GC mass spectrometer, confirmation of test results was impossible to obtain. In any case, the U.S. method was long and cumbersome and Karumanchiri made some changes to shorten the procedure and make it practical for daily use.

By approximately mid-1978, Karumanchiri had tested between 30 and 50 samples by the method he had developed. In the course of the testing he had discovered that some samples were being tested in the preparation of which DEPC had not been used but nevertheless Ethyl Carbamate was showing up. In Karumanchiri's words, "the crucial part of that discovery was that the Diethyl Pyrocarbonate was not the sole source of Ethyl Carbamate contamination." Karumanchiri reported this to Mr. Clarke.

Clarke testified that at the early stages when Karumanchiri was reporting these results, orally, he was not particularly concerned because he had heard reports of American wines in which levels of Ethyl Carbamate had been found at from 0 to 20 parts per billion, which were not considered significant.

According to Karumanchiri, when he advised Clarke that he had found Ethyl Carbamate in wines to which Diethyl Pyrocarbonate had never been added "he asked me to stop all work on it." He did not understand why this instruction was given but he obeyed it, at least at first.

Karumanchiri next worked on Ethyl Carbamate as a by-product of a procedure he developed for testing for a different substance, Dimethyl Nitrosamine, in beer in 1980.

At that time, Mr. Karumanchiri had received some new equipment in the lab, namely a gas chromatograph equipped with a Hall detector. In Mr. Karumanchiri's words, "the Hall Detector is an extremely sensitive detector and it can be made specific for different elements present in organic chemicals." Mr. Karumanchiri set up the machine in such a way that it would detect only organic compounds that contained nitrogen.

After having satisfactorily worked out the method for detecting nitrosamines in beers, he decided to see if there were any other beverages, of an alcoholic nature, that also contained nitrosamines. He did some studies on wines and found that they contained no Nitrosamines but the experiments produced a chromatogram that showed an interesting peak, reflecting a component of the wine he was testing.

A chromatogram is a physical paper record produced by a chromatograph. Upon the paper, which moves at a set speed beneath a stylus attached to the gas chromatograph, is printed a horizontal scale representing time and a vertical scale which relates to the quantity of the compound or substance for which the test is being run.

The machine and method will be described in detail in Appendix II. At the risk of gross over-simplification, it may be said that the substance to be tested, when properly prepared, is put through what is known as a capillary column which permits different substances to flow through at different rates. By comparing the time at which "peaks" register upon the horizontal scale with the predetermined times required for various known substances to flow through the tube, it is possible to say whether or not a given substance is present in the material being tested. By measuring the area under the peak and performing certain calculations, it is possible to determine the amount of the substance present.

Mr. Karumanchiri found a peak that he thought might be Ethyl Carbamate.

He then injected a standard of Ethyl Carbamate; in other words, a sample with a known concentration of Ethyl Carbamate was injected into the machine and it registered the same retention time or peak as had the wines.

Mr. Karumanchiri knew, of course, that DEPC had been banned because it could cause Ethyl Carbamate and that the reason for the ban was that Ethyl Carbamate was considered to be an animal carcinogen and a potential human carcinogen.

In 1978 Mr. Karumanchiri had read in the scientific literature a report written by a Professor Ough who had developed a method for testing Ethyl Carbamate. Mr. Karumanchiri found that that method was very time-consuming, but he was able to adapt it to his method with the new equipment already mentioned. In addition, Karumanchiri modified the method by adding to each sample, prior to the extraction process, what he described as an internal standard. In this case, the internal standard was Nitrobenzine at a concentration of 1 ppm (part per million).

At this concentration, the substance produces a peak of a known height. If the Nitrobenzine peak in the sample tested is lower or higher than that known peak, it indicates an error in the extraction or injection process. This provides a constant reference point for increased accuracy.

By October 1980, Mr. Karumanchiri had perfected his new method and he was routinely testing table wines for Ethyl Carbamate. He started reporting to his superior, Mr. Clarke, and this time received a different response because the method published by Ough, referred to above, had resulted in the finding that some wines which had not used DEPC did contain Ethyl Carbamate. At this time, then, Clarke did not tell Karumanchiri to stop his work but told him to get the results confirmed.

By confirmation, both scientists understood that what was desired was the duplication of Karumanchiri's results by a different laboratory.

The method recommended in the literature was gas chromatography mass spectrometry, the details of which need not concern this section of the Report.

The L.C.B.O. lab did not possess a mass spectrometer and, in any event, scientific standards require confirmation by independent workers before they are generally accepted by the scientific community.

Karumanchiri inquired of the Ontario Research Foundation and the Ministry of the Environment. For reasons that are of secondary importance, neither laboratory was able to assist him. He then tried one lab in Niagara Falls, but after about three months it developed that they did not have all the equipment required for satisfactory work. Eventually, the Mann Testing Laboratories Ltd. was recommended; it was found that they were properly equipped and samples were sent to them for testing and confirmation.

The identification and enlistment of a competent outside laboratory capable of confirming the results being obtained by Karumanchiri was left entirely to the latter. One can only speculate about the possibility that time would have been saved if Clarke had thrown his authority as a Department Head into the project rather than leaving it to Karumanchiri.

At any event, early in 1981, Karumanchiri began the search and in December of 1981 he had a meeting with Dr. Pierre Beaumier, the Chief Chemist and Vice-President of Mann Testing Laboratories, a large commercial organization which has, as well as much other equipment, six mass spectrometers. Dr. Beaumier agreed to test certain samples which Karumanchiri delivered to the lab and he delivered as well a carbowax capillary column suitable for the identification of Ethyl Carbamate.

Dr. Beaumier was of the opinion that Mr. Karumanchiri's method of testing was effective and indeed the same method is presently used in the Mann Laboratories. However, Karumanchiri did not have a mass spectrometer, a much more precise tool for the identification of a particular compound. Dr. Beaumier refused to claim absolute certainty but was satisfied that the mass spectrometer produced a much higher degree of certainty and that it is the best method available today, routinely used in chemical trace analysis.

Initially, because of the high cost of testing, only four samples were submitted to the Mann Testing Laboratories. The purchase order, supplies received report and invoice from Mann Testing Laboratories Limited together with their first report dated February 3, 1982, were filed together as Exhibit 35 in this

Inquiry. This report confirmed the presence of Ethyl Carbamate in all four samples. Following receipt of the report, Karumanchiri asked Clarke to obtain further data about Ethyl Carbamate, including a toxicology data bank printout.

In view of a statement made in the Karumanchiri report which will be referred to immediately below, it should be pointed out that the proportion of Ethyl Carbamate, i.e., the quantitative result, was in no case identical to that obtained by Karumanchiri. It was usually a somewhat lower value but in each case the quantity was significant.

Karumanchiri in his testimony indicated that the purpose and reliability of the Mann Tests related to qualitative analysis principally, that G.C. mass spectrometry provides more dependable qualitative results, and this was more important than the quantity reading obtained.

In any event, Mr. Karumanchiri took the first Mann report, dated February 3, 1982, to Clarke as soon as it was received. In fact, Karumanchiri believes that the confirmations were first received by telephone and that he advised Clarke of this even before the written report was received.

On or about March 30, 1982, Karumanchiri delivered to the Mann Laboratory a further eight samples, two of which were standards and the remaining six of which were wine samples prepared by him. Again, qualitative confirmation was received and reported on by letter from the Mann Laboratories dated April 15, 1982.

With respect to these ten samples which by that time had been analyzed by the Mann Laboratories, Dr. Beaumier testified that they were done as qualitative confirmations and that little or nothing could be drawn from the quantitative results. In other words, he was prepared to stand behind the identification of the substance found as Ethyl Carbamate but not to attach great reliability to the quantitative figures.

Meanwhile, Karumanchiri had received no comment or instructions from Clarke but was proceeding to test an additional large number of samples.

Because several of the early positive test results had concerned Brights' wines, he decided to test all the Brights' products.

Mr. Karumanchiri reported to Clarke from time to time, mostly orally but sometimes by means of a written list, and he testified that he "...suggested to him many times that the matter should be reported immediately to the federal authorities because I believed there was a violation of the Federal Food and Drug Regulations."

Karumanchiri had originally developed an interest in Ethyl Carbamate because of his belief, shared by Clarke, that Baycovin was a useful material for the wine industry and that if it was not, in fact, the sole producer of Ethyl Carbamate, perhaps the decision to ban it had not been correct. By this time, however, Mr. Karumanchiri's concern had deepened. By early 1982 he had close to 100 samples in which Ethyl Carbamate had been found and he believed that the substance was an animal carcinogen with the potential of a probable human carcinogen.

According to Karumanchiri's testimony, by April 1982 he had been bringing reports of his findings to Mr. Clarke since 1980 and urging him to report the matter to health authorities. At page 505 of the transcript is found the following testimony, referring of course to Clarke: "And he would listen and he never said, yes, I will do this or I will do that. In April of 1982, I decided to put all these things, all the data together and make an Interim Report. I typed it at home and I decided to give a copy of it to Mr. Couillard."

Karumanchiri prepared the report from the original records he had kept in the lab, wrote it out in draft form and then took it home and typed it at home. His explanation was that he wished, for the first time in his career, to go above his immediate superior, Clarke, fearing that Clarke, who was about to retire, would drag the matter out until his retirement without doing anything about it and not wishing their common secretary to be in a position to notify Clarke prematurely of the report.

At the same time, Karumanchiri states that he prepared a copy for Mr. Clarke and delivered it to Clarke's secretary. Clarke was, in fact, absent for a day or two and did not, he states, receive the report until it was brought to his attention by Couillard.

Clarke acknowledged being away at the time the report was prepared and stated that he was upset that the report had gone to Mr. Couillard without going through him, "because it did throw a monkey wrench into the normal reporting procedure."

It is established that the report Mr. Karumanchiri prepared was received by Mr. Couillard on April 20, 1982.

According to Clarke, in the time immediately preceding that report, Karumanchiri gave him nothing apart from the Mann reports. Clarke states that he asked Karumanchiri to summarize the results of his testing so that he could put it in a report together with toxicity and other data relating to the Food and Drugs Act and Regulations and place the whole before his superior, Couillard. Clarke states that, in fact, although the report was received by Couillard on April 20, it was in early May that he, Clarke, received it and on the same day Mr. Couillard came down to Clarke and advised him that he, Couillard, had received a report. It is Clarke's recollection that Karumanchiri had brought it to him stating that he, Clarke, was away at the time the report was presented.

Clarke stated in his testimony that he had in mind combining Karumanchiri's technical report, the toxicological data obtained and comments of his own in a report to Couillard with recommendations. As to the type of recommendations, he answered as follows: "Well, the recommendations were as indicated that there were high levels in these wines, the material was toxic and our normal procedure in cases such as this was to delist, to remove from sale, such products."

When it was put to him that Karumanchiri's recollection was of speaking to Clarke and expressing the view that the matter should be reported to the federal authorities, Clarke did not state whether he had a recollection of such a proposal, but did reply that "It would be unnecessary for him to make that proposal. Of course it should be reported to the federal people and we were coming to the point, we had got confirmed information, we had knowledge of toxicity and we were coming to the point of a report which would have included references to our relationship with the federal people."

It was, of course, a recurring theme throughout the evidence of Clarke, Couillard and Parker, Clarke's successor as Director of the Lab, that there was in existence no federal regulation regarding acceptable levels of Ethyl Carbamate.

The report, herein referred to as the "Interim Report", consisted of a summary page and four pages of test results. It was received in evidence as Exhibit 36 and a brief summary is necessary for an understanding of much of what follows. It was stated that 146 wines, 12 spirits and 15 beers had been analyzed with a detection limit set at 10 parts per billion (ppb). No beers showed Ethyl Carbamate exceeding that limit. Of the 36 imported wines, none exceeded the limit. It had been found that Brights' wines showed very high levels of Ethyl Carbamate and therefore all of their wines were tested together with 50 wines from other domestic wineries. Out of the 60 Brights' wines, one showed 70 ppb, and 55 showed E.C. at levels anywhere from 100 ppb to 12,250 ppb. Four showed less than ten ppb.

The report then stated that most of the remaining 50 domestic wines were free of Ethyl Carbamate but "a few wines from other wineries" also had high E.C. values. The concluding two paragraphs of the summary page are worth reproducing in full. They are as follows:

> Carcinogenicity of Ethyl Carbamate had been assessed and documented through many animal exposure studies since 1977. Details can be found in the Computer printout from Toxicology Data Bank. This report indicates that Ethyl Carbamate reacted as a strong carcinogen, in mice and hampsters, whether the chemical was ingested, inhaled or absorbed through skin. This chemical is often used to induce certain types of cancer in animals, to study the effects of new drugs to combat human cancer.
>
> It should be remembered that the suspected contamination of wine by Ethyl Carbamate, at levels as low as 10 mic.g/L, resulted in the worldwide prohibition of the yeast inhibiter "Di-ethyl Pyrocarbonat" [sic] (trade name Baycovin).

Ten mic.g/L is the equivalent of 10 parts per billion. Page 2 is a list of 40 Brights' wines. Page 3 lists 13 of Brights' ports and sherries and Loganvale Wine Cocktail. Page 4 lists 15 domestic wines from other wineries with levels of contamination ranging from 30 ppb to 480 ppb, together with the statement that the remaining 35 samples of domestic wines showed no contamination above 10 ppb. Page 5 listed 12 imported spirits of which two showed less than 10 ppb and the balance contained between 20 and 230 ppb.

Two observations about the accuracy of the summary page should be made. Though it was stated that only four of 60 Brights' samples had shown levels of less than 10 ppb, only 55, not 56, are listed on pages 2 and 3 of the report. In addition, the report refers more than once to "safe levels" of less than 10 ppb. In fact, it is abundantly clear from all the evidence that in April of 1982 no authority anywhere in the world had established or suggested safe levels of Ethyl Carbamate in wine.

The summary page also contained a statement that confirmatory analyses had been carried out by Mann Testing Laboratories on ten samples and that "all 10 samples were confirmed positive by Mann Testing Laboratories at levels very close to our own test results."

In fact, while all ten samples had been confirmed positive, the correlation with respect to levels was not particularly striking. It will be recalled that the tests had been made principally for their qualitative results in indentifying the substance and that the quantitative results were secondary and, to some extent, less reliable.

In other respects the summary page of the report would seem to be an accurate, dispassionate account of what had been found and the two paragraphs which have been set out above contained information respecting carcinogenicity of Ethyl Carbamate which was already known to Couillard and to Clarke and which was available to any technician or scientist who had kept up with the literature in the area of concern.

On April 20, 1982, then, Karumanchiri and Couillard agree that an appointment was arranged, Karumanchiri brought the report to Couillard and they discussed it briefly. Mr. Couillard states that Karumanchiri "told me about it and then left so that I could read it, get to understand something about it." Asked whether Couillard had questioned him about it, Karumanchiri stated "No, as far as I could remember he listened to all these things and he may have asked one or two questions, but I don't recall exactly what he asked. After I had narrated what I had found and everything, he told me he would take up the matter to the Chairman."

Couillard states that this was the first that he had heard about any testing going on in the L.C.B.O. lab for Ethyl Carbamate.

During the next day or two, Mr. Couillard had occasion to go to an industry meeting in the Niagara Falls area. He said nothing about the report or its contents to anyone on that occasion. Upon his return, Clarke was absent for a few days, but some days after receiving the report he met with Clarke and discussed it.

Mr. Couillard stated to Clarke that he would have to take the report to the Chairman.

All three agree that there was a brief meeting during which Couillard, Clarke and Karumanchiri were all present and there was some discussion of the report.

On May 11th, Couillard and Clarke took the report to the Chairman and met in his office.

Asked why he did this, Couillard stated: "Well, I felt that some action would have to be taken to deal with the report and that it was a matter where the decision had to be made by the Chairman as to how we should proceed."

At this time, William John Bosworth was Chairman of the Liquor Control Board, having been appointed in 1976 on April 1st. At the time of the meeting, now to be described, he was 65 years of age. Mr. Couillard stated that he requested a meeting with Mr. Bosworth. In his examination-in-chief, Mr. Bosworth initially stated as follows:

> Mr. Clarke and Mr. Couillard came to see me in my office and Mr. Clarke read from a lab report, I don't know whose report, but it was a lab report, and that they had discovered Ethyl Carbamate and I understood it was in one brand of Brights' fortified wine. So, I don't know who suggested, but someone, one of the three suggested that they call Brights and have a meeting with their technical people. So, anyway, I volunteered to call Brights. I called Mr. Arnold who was the President, and told him we would like to see his technical people. He did arrange a meeting for the next day, sent his technical people in, and we had our meeting the next day."

Mr. Bosworth stated that the meeting with Couillard and Clarke lasted less than ten minutes. Asked if any document had been shown to him, he said no, but that Mr. Clarke read the document, or at least one of them read a document to him, a lab report. Shown Karumanchiri's Interim Report, he stated that he had never seen it until it was shown him by this Commission's investigator. He was unable to recognize the report. Asked about details he stated: "It is pretty technical and I couldn't say." When asked if he remembers that some 56 out of 60 products of Brights had a possible problem, he said, "No. I understood it was one brand." He does not remember the word "carcinogenicity" being used and he doubts if it would have had any significance to him. He does not know any chemistry. Mr. Bosworth said the word certainly means something now, but it did not at that time.

Shown the lists making up four pages of the report, he stated, "This is the first time I have seen this list."

As he had promised, Mr. Bosworth on the same day telephoned Mr. Arnold, President of Brights Winery. About that he gave the following testimony:

> Q. Do you recall what you would have said to Mr. Arnold?
>
> A. No, not exactly. I told him they had found a chemical and our people wanted to talk to his technical people and I might have told him Ethyl Carbamate but I wouldn't be sure, I don't remember the conversation all that well.
>
> Q. Well apparently four of his people were down at the Liquor Board the next day. Did you express to Mr. Arnold that there was some degree of urgency in this matter or concern?
>
> S. I don't believe so, no.

Mr. Arnold, President of Brights Winery, testified that at the time in question he was away from his office and he thought that he was in Edmonton. Upon telephoning his office he was advised that a call had been received from Mr. Bosworth. Arnold, therefore, called Bosworth and testified as follows:

> I have no idea if he knows I was calling from Edmonton. In the course of this conversation, it was a very short one, I wanted to know why he had called, and he proceeded in, I would say, not a clear way of asking if we were having any problems with wine, or wines, I am not sure, and I said "No". The long and the short of it was we left it that I would contact Dave Diston and he would contact Bill Bosworth. I remember him saying "No" Mr. Diston should contact Jack Couillard and I said "Fine".
>
> ...
>
> When I think back, no comments like the compound Ethyl Carbamate was mentioned. I am very sure of that, I am not sure of some of the other parts of the conversation because I was not able to convey to Dave Diston exactly what the problem was, other than it concerned the lab, the Liquor Board, Bill Bosworth phoned me, so I had to do something. I told Mr. Diston that--I had suggested he call Mr. Bosworth and Mr. Bosworth said "No, call Mr. Couillard."

Mr. Clarke testified about the meeting with Mr. Bosworth who he described as the "Chief

Commissioner". Clarke had with him Karumanchiri's report and his copy of the toxicity information. He thinks Mr. Couillard may have said something by way of introduction and then he, Clarke, stated that there was a report in which Brights' wine indicated a high level of Ethyl Carbamate and he referred to some of the values "... and then I read the report of the toxicity, mostly the underlined items that I have in mind in the report indicating that it was Karumanchiri's teratogenic and therefore a potentially cancer-producing substance." (The reference here is to the toxicity printout that Clarke had obtained from the Toronto Public Library, Exhibit 60, scattered throughout which are many items that have been underlined and that refer to carcinogenicity, teratogenicity and various forms of cancer produced in animals).

Clarke stated that Bosworth did not have a copy of the Carbamate report in front of him but there were documents that Clarke had presented lying on his desk. Asked if he looked at them, Clarke's answer was, "Well, in a cursory sort of way, yes. He didn't take them up and study them, no, but he looked towards them anyway."

When asked whether Bosworth asked any questions, Clarke's answer was, "He didn't ask me particularly. He did ask Mr. Couillard what shall we do."

Couillard's account directly contradicts portions of both the other accounts. Couillard states the report of Karumanchiri was taken to the meeting and that Mr. Bosworth was given a copy at the time. Couillard's examination-in-chief proceeded as follows:

> Q. You are clear in your recollection of that?
>
> A. Oh definitely, yes.
>
> Q. Did he read through the report?

> A. Well, he examined it. He opened it and he led [sic] through it. As far as reading every word, I do not know, but I opened the meeting to say why we were here and I gave him a copy of the report. He had that on his desk in front of him and he opened it and he examined it, and then he had some questions which I deferred to Percy Clarke to answer the questions.
>
> Q. Did they appear to be intelligent questions, if I can use that expression?
>
> A. Oh yes, yes. He wanted to know really what it was about.

Clarke's evidence was that Bosworth asked Mr. Couillard what should be done and Couillard's suggestion was to talk to Brights right away.

Clarke adds:

> A. The Commissioner also said that, who knows with this. [sic]
>
> Q. Who knows about it yes?
>
> A. And the only people directly involved with [were] Karumanchiri and myself and so I said only two or three people.

He went on to say at a later stage of his examination:

> A. Well, at the Commissioner's office when it was said by

> myself that there were only two or three people that knew it, and he said well, let us keep it--say nothing about it for the time being and tell the people. So then this information then became information that we would not talk freely about.
>
> Q. To anybody?
>
> A. To anybody.

Mr. Couillard stated that,

> "The Chairman decided that the matter would be kept confidential to the three of us and just those people that it was necessary to be aware of it. It was decided, and I don't know how I made the suggestion myself that we contact Brights immediately and make them aware of the problem and seek suggestions as to what to do about it. The Chairman said he would call Ed Arnold, the President of Brights, and apprise him of the situation immediately, which he did after the meeting."

On that issue, Bosworth was asked for his recollection and his answer was:

> A. There was no secrecy at all.
>
> Q. You are clear in your mind on that?
>
> A. Yes.
>
> Q. On that there is no doubt in your mind?
>
> A. No.

Told that Karumanchiri had said he was told it was a Board decision and this was to be a secret matter, Bosworth stated that that would surprise him.

Finally, Bosworth stated that he could not recall there being any discussion about keeping the matter a secret or keeping it away from anybody else and that, if such a thing had happened, he thought it was something he would recall.

Mr. Bosworth's current recollection is that he thought the problem concerned one fortified wine and it was supposed to be one of Brights' low volume items.

Mr. Bosworth stated that on the following day he attended at the beginning of a meeting between his laboratory people and Brights' technical people but that he stayed only a few moments and did not engage in the actual discussion. Apart from that meeting, he stated that he had never again heard of Ethyl Carbamate until the day of, or perhaps the day preceding, the public announcement by the Minister in November of 1985. Furthermore, at the time of the Brights meeting, in answer to a direct question from the Chairman of this Commission, he stated that he did not have in his mind that it was a cancer-causing substance that was being discussed.

When he was asked about the action proposed at the meeting with Couillard and Clarke, the following question was put to him:

> Q. Had you have looked through that report, you would see also that there was some testing done on some other Canadian wines, certainly not to the extent of Brights', would you have asked questions whether this is just a Brights' problem or is this possibly an industry problem?

> A. Yes I am sure I would have asked.
>
> Q. It would be a natural question to ask?
>
> A. I would have asked if it was an industry problem. Yes.

Mr. Couillard stated that, although it was his feeling that the matter should be kept confidential, it was Mr. Bosworth who made the determination that this would be so.

Taxed with Mr. Bosworth's statement that he had thought the problem lay with a single low volume item, Mr. Couillard responded, "I think his memory must have failed him." The questions went on:

> Q. You are clear in your mind that the list was there and there was a discussion that it was a large number of products from Brights' that were involved?
>
> A. Definitely yes. Had it been one product of Brights', I would have dealt with it myself, I would never have gone to the Chairman.

Mr. Couillard stated that he kept Mr. Bosworth informed from time to time of developments in the Ethyl Carbamate story although he admitted that these were not formal reports nor was the information passed at formal meetings but rather incidentally in the course of other meetings or occasions.

Here, then, are some serious problems of credibility.

All three of the men concerned have long since retired from the L.C.B.O. No doubt each man would like it to be thought that he acted properly and that he leaves a good reputation behind him. In any other sense, there is little, if any, motive for any of them to lie or to deliberately attempt to mislead the Commission. The only qualification I would make to that statement is that, as we shall see, shortly after the meeting we have been discussing Clarke put forward to Couillard a proposal for his own part-time employment as a consultant after his retirement, then imminent, and this proposal involved continued study of the Ethyl Carbamate problem. The proposal was eventually rejected by Bosworth, at least nominally, and, although Couillard states that he supported the proposal, the memorandum he is said to have forwarded to Bosworth supporting the proposal has not been found. At any rate, it may be Clarke's opinion that Couillard did not support him. And he may not have particularly happy memories of either of these men, his superiors.

I have had the advantage of hearing all three of these men testify and I have considered their testimony with the greatest of care.

I have reached the conclusion that Bosworth's account is the least reliable and does not truly reflect what occurred.

I have no doubt that Karumanchiri's report and the toxicology printout were both on the table at the meeting. It may well be that Bosworth was not actually given a copy of the report. Nevertheless, I have no doubt that he was referred to the report and at the very least an ample verbal synopsis was made for his benefit. Clarke states that Bosworth gave the report a cursory look. Couillard states that Bosworth looked through the report and was anxious to understand it. Clarke states that he, Clarke, read the report and that he read certain portions of the toxicology report referring to the carcinogenicity of Ethyl Carbamate.

I accept Mr. Bosworth's testimony that the word "carcinogen" meant nothing to him at that time, and I am quite satisfied that he had no appreciation of the technical side of this matter having, as he stated, no training whatever in chemistry.

I am also prepared to accept his statement that he understood the problem concerned only Brights. Certainly, the emphasis in the report was on Brights and in their testimony both Couillard and Clarke indicated that the talk had been in terms of Brights' problems and it may very well be that they conveyed the impression to Bosworth that that was the only manufacturer involved.

However, I cannot accept Bosworth's statement that he understood the problem affected only one low selling brand of Brights' manufacture. No account, however truncated, of the Karumanchiri report could have left that impression. Bosworth's memory has obviously failed him in this respect.

Similarly, I believe the statements of both Clarke and Couillard that the decision to keep knowledge of the matter to those who already knew was that of Bosworth, though Couillard had no doubt that this was the correct decision, and it is one he would have recommended himself and perhaps he did so. This decision by Bosworth is again inconsistent with his alleged belief that the problem concerned only a single brand.

Many corroborative points are found in the evidence, but to my mind perhaps the most convincing is the utter improbability of men such as Clarke and Couillard going to the Chairman of this large and important enterprise and permitting him to conclude from their presentation that a minor problem concerning one product of one manufacturer was the only one with which they were concerned.

Bosworth's action of calling the President of Brights on the telephone and arranging a meeting substantiates his statement that he understood that the main problem related to Brights. It is not, however, the action of the head of such an enterprise who believes that only a problem on the scale he now professes to recall was involved.

At any rate, with or without Couillard's recommendation, and I believe that the recommendation was made, the instruction to keep it within the group that already knew was given and many of the subsequent problems arose from the fact that this instruction was taken most literally and was slavishly obeyed.

Mr. David Diston, Vice-President and General Manager for Ontario of Brights, testified:

> Q. Was anything said, to your recollection, about keeping the matter confidential as between the Board and Brights?
>
> A. The Board told us that they did not intend to publicize it within their own organization, other than to people who needed to know and that was the extent of the sharing of information there.
>
> Q. Do you recall who it was when you said "the Board"?
>
> A. I believe it was Mr. Bosworth.

Before the disclosures which led to the appointment of this Commission were made, Bosworth, Couillard and Clarke had each retired and been replaced. Neither Bosworth nor Clarke said anything whatever about the Ethyl Carbamate situation to their respective successors. Couillard communicated to his successor, Flett, the fact that a problem had developed but he did so in a way that did not convey a sense of importance to Flett or stimulate him to follow up the information. We digress somewhat to indicate what was done at each level.

In July of 1984, the present Chairman, John Ackroyd, was appointed to the Board with the understanding that he would become Chairman upon Mr. Bosworth's retirement. During the intervening time, Mr. Bosworth had to be away for several weeks, with the result that there was in practice an overlap of approximately six weeks during which Mr. Bosworth had the opportunity to acquaint Mr. Ackroyd with the duties of the Chairman and with any outstanding problems. Mr. Ackroyd testified that he was not given any sort of a briefing book, but that Bosworth "...did show me certain files dealing with personnel, acquainted me, you know, of certain problems within the Board that I should be aware of."

At this time, Mr. Couillard was also preparing to leave the Board, which he did at the end of October, 1984.

During this period of time, Bosworth did not introduce Ackroyd to Parker, who by that time had become Director of the Laboratory, and Couillard said nothing about any problem then present in the lab, though as Assistant General Manager, Products Division, Clarke and subsequently Parker reported directly to him.

Ackroyd's testimony, which I accept completely in this regard, was that he knew nothing whatever about Ethyl Carbamate until it was reported to him by Flett, Couillard's successor, specifically on November 6, 1985, although a day or two earlier Flett had indicated that there might be a somewhat troublesome memorandum coming up from the lab.

Clarke was due to retire on September 30, 1982. By June of that year, Allan Parker, Assistant Chief Chemist in the laboratory, had been picked as his successor, but at no time before he left did Mr. Clarke reveal to Parker the discoveries that had been made in the lab concerning Ethyl Carbamate. He was very clearly questioned about this by Commission counsel in the following terms:

> Q. And if I am clear, you deliberately did not brief Mr. Parker when he assumed the role of Director of the lab on this problem; is that correct?
>
> A. That is correct.
>
> Q. And your reason for so doing was that Mr. Karumanchiri already knew and a decision had been made, higher up Mr. Couillard was aware, Mr. Bosworth was aware that there was no need to tell Mr. Parker?
>
> A. I think I would have been violating that promise of secrecy to have talked to anybody other than those people that I said knew about it.
>
> Q. Even the new man taking your job?
>
> A. Well the new man taking the job would be briefed by his boss as soon as it was thought appropriate by his boss.

Parker testified that as at the date he was appointed Director of the lab, October 1, 1982, he had never heard of a substance known as Ethyl Carbamate. He first heard of the substance and of the problem when Karumanchiri came into his office during the first week of November, within days following his appointment, and told him that there was something he should know about. He then recited the history of Ethyl Carbamate and advised that in his analysis he had found the substance in wines to which no DEPC had been added. He further indicated that urea was involved in the formation of Ethyl Carbamate and that he had actually made Ethyl Carbamate by heating urea and alcohol in the lab. Karumanchiri indicated that Ethyl Carbamate was found in Brights' wines and that he had been working with Brights' wines but he did not discuss the Interim Report of May 12th or any of the events that had occurred between the date of the Interim Report and November 1982.

Parker stated that he was stunned by this revelation and didn't know what to do but immediately went to the Merck Index, a scientific reference work, and discovered that Ethyl Carbamate was listed and that it was a carcinogen. Then he started to go through Clarke's files. More of this later.

At the operating level, therefore, there was no formal handing over of the problem upon the change of management.

Once again, if Karumanchiri had not voiced his concern, knowledge of the problem by lower management might have been delayed indefinitely.

At or about the time of the meeting with Bosworth, May 11, 1982, Couillard started to keep a file to which the name "Beta" was given. Further attention will be paid to this below, but suffice it to say now that from time to time Couillard placed in this file letters, documents and memoranda that appeared to him to have significance in relation to the Ethyl Carbamate problem.

Ronald John Flett first became a full-time employee of the L.C.B.O. in November of 1972 as a clerk in a downtown Toronto store. In 1982, he was appointed Director of the Products Listing and Control Department, reporting directly to the General Manager, Mr. MacInnis. On November 1, 1984, he became Assistant General Manager of the Products Division, the job that had been held by Couillard, except that Flett's previous area was added to that position and Flett had responsibility for four major functions rather than three. Flett knew that he would be appointed to the position towards the end of September of 1984 and by that time Couillard also knew that Flett would be his successor. Between that time and October 31st, Flett met frequently with Couillard for periods ranging from half an hour to a full day each week to discuss the changeover. In answer to Mr. Powell, Flett stated that,

> I didn't feel I was finding out to my satisfaction the overall management function in terms of how to handle such diverse areas as purchasing and traffic and laboratory. I had previously done my own job so I knew what happened there but I wasn't necessarily familiar with the other three and I was expecting to hear a little bit more about that.

During one of the meetings in Couillard's office, the latter brought forward a file and said he was not quite sure what to do with it. He stated that he had thought of taking it home, thought of just getting rid of it, but had decided he would pass it over to Flett "so if something comes up you will have it to refer to" and he went on to say that "it contained information regarding some work that Alex Karumanchiri had done in the lab on a compound called Ethyl Carbamate...." He indicated he had discussed the work with Karumanchiri and Clarke, that the compound might be a carcinogen, and that he, Couillard, had subsequently raised it with the Chairman, Mr. Bosworth. The decision had been to keep working on the compound. Alex had done some work that indicated that there was a solution and the decision made between Couillard, Clarke and Bosworth had been not to publicize it but to continue working on it with the wineries involved.

Couillard went on to say that the lab was working with the wineries involved, that they appeared to be having success because the levels were coming down, and that Parker and the lab staff would deal with the wineries whenever something came up. "They were fully conversant as to what to do if a problem arose."

Flett stated that he glanced at the file the same as he had glanced at others, that it appeared to be a fairly technical issue, that he didn't see any need to deal with it other than that he had been told to be aware of it and the lab knew what they were doing. "That is the way I dealt with it", and he put it in the right-hand drawer of his desk.

Flett also stated that he had seen two memos in the weeks immediately preceding that meeting, one concerning a particular product and one a general memo that the Rare Wines stores were not to list any brand of sherry produced in North America prior to clearance by the laboratory for content of Ethyl Carbamate.

Flett stated he had gone to Parker to ask him what that was all about and Parker had referred him to Couillard, but Flett did not pursue it further.

This file was, of course, the Beta file and Flett testified that he did not examine it further and that he did not look at it again until the day preceding Ackroyd's meeting with the Minister which precipitated the appointment of this Commission.

As to the reference to Couillard's statement that he had thought of taking the file home, I accept Couillard's explanation that this file had been kept in a locked drawer along with certain personal files and it was the entire contents of that drawer to which he referred when he talked of taking it home. It did not arise from any improper desire to keep the matter secret or to "cover up" any improprieties. The explanation for the remark, however, does not excuse Couillard's failure to emphasize to Flett the potential importance of the matters dealt with in the file.

At this level, therefore, the man with direct managerial responsibility did discuss the Ethyl Carbamate problem briefly with his successor and gave him the means, in the Beta file, of discovering at least an outline of the problem. In his testimony before the Commission, however, Couillard indicated that he felt at that time that the problem had been essentially solved and there was need for Flett only to be aware of it. He quite obviously did not present it to him as a matter of urgency and even though Flett states that the possibility of there being a carcinogen was mentioned, nothing in Couillard's words or attitude would have indicated to Flett that this concerned a matter of any urgency or that it was a threat to the health of consumers of the products. As is seen from other testimony, Couillard did not himself consider that there was an urgent problem.

With respect to the matters so far discussed, the following conclusions have been reached.

Karumanchiri acquired knowledge of the presence of Ethyl Carbamate in some products before 1978. He was told by Clarke to discontinue testing, and Clarke's statement that this was because priorities had to be selected in a busy lab is accepted.

After the Hall Detector was purchased in 1980, Karumanchiri kept finding Ethyl Carbamate in various products tested. He kept Clarke advised of the progress of his discoveries.

Clarke told Karumanchiri to get his results confirmed but gave him no assistance in doing so and confirmations were not obtained for over a year after Karumanchiri was told to do so. Karumanchiri bears no share of any blame for this. He pursued the matter as vigorously as his subordinate position permitted him to do.

Both Karumanchiri and Clarke knew that Ethyl Carbamate was an animal carcinogen and a potential human carcinogen.

Shortly before April 20, 1982, the presence of Ethyl Carbamate in various products was brought to the attention of Couillard on the initiative of Karumanchiri. Though it may have been Clarke's intention to report to Couillard eventually, he was very dilatory in doing so and Karumanchiri's expanation for by-passing Clarke, mainly that he was concerned that Clarke's retirement would occur with nothing done, is accepted.

Couillard, because of his experience in the industry and his consultation in earlier years with the Federal Department of Health, knew that Ethyl Carbamate was a potential carcinogen, but personally believed it to be a "mild one".

On May 11, 1982, Couillard took the report to the then Chairman, Bosworth, accompanied by Clarke.

Couillard, as the senior executive, had the responsibility for notifying Bosworth of the problem in terms that he could understand, lacking technical training or expertise as he did.

At the conclusion of the meeting, I find that Bosworth was fully aware that many of Brights' products had been found to contain Ethyl Carbamate. He knew that Ethyl Carbamate was an undesirable substance but, because of his lack of technical background, he did not make the connection between the words "carcinogen", "carcinogenicity", and cancer-causing. He accepted Couillard's suggestion that the L.C.B.O. should work with Brights' technical staff and he himself gave instructions that knowledge of the problem should be confined to those in the L.C.B.O. who were already aware of it. The question of reporting the matter to the Food and Drug Directorate of the Federal Department of Health was not discussed with Bosworth at any time.

As with so many of the problems that arise in Canada as a federated state, there is uncertainty as to the extent to which any government authority has jurisdiction over the liquor trade. In view of the decision of the Supreme Court of Canada in Labatt Breweries of Canada Limited v. Attorney General of Canada et al., [1980] 1 S.C.R. 914, it cannot be stated with certainty that Parliament has the authority under the Food and Drugs Act to provide for regulation of the content of various forms of liquor. Nevertheless, it has purported to do so and it has always been considered in the industry that the Health Protection Branch of the Federal Department of Health and Welfare is the governing authority with respect to questions of health and safety. Clarke expressed to the Commission the view that the proper procedure in the event that a health-affecting substance was discovered by the laboratory was to refer the matter to the federal authority and meanwhile to suspend distribution and purchase of the offending product. It is the opinion of this Commission that such a procedure is correct and in fact it is the procedure now in place and followed by the L.C.B.O.

That the Government of the Province of Ontario shares this view of federal jurisdiction is apparent from paragraph (8) of the Commission's Terms of Reference which provide that the Commission should recommend permissible levels of Ethyl Carbamate in liquors "provided that no standard for a permissible level is set by a federal authority prior to the interim or final reports required hereby", an instruction responded to by the Commission's first report on December 11, 1985.

It must be remembered that in 1982, and indeed until some time after the appointment of this Commission, the federal authority had made no regulation respecting Ethyl Carbamate, and it was not a prohibited substance. Nevertheless, both Clarke and Couillard were fully aware that the reason for the banning of Baycovin had been the fact that it was the apparent cause of Ethyl Carbamate and that the latter was a known animal carcinogen and suspected human carcinogen. Having once accepted that the Federal Department of Health was the proper authority to rule upon food and drink components from the point of view of the health and safety of the consumer, I have no doubt that it was the duty of the L.C.B.O., as an institution, to report without delay the fact that Ethyl Carbamate had been found in a number of beverage alcohol products and to leave to the federal authority the responsibility for determining whether such products should be withdrawn from public sale or banned completely or subjected to further examination.

Within the L.C.B.O., it was the ultimate responsibility of Bosworth, as Chairman, to ensure that the discovery was reported. While Bosworth did not have the training or background to enable him to apprehend immediately the meaning and consequences of the report made to him, the fact that it was made and that it was brought directly to him by the Chief Chemist, Clarke, and the Assistant General Manager, Couillard, by-passing the General Manager, MacInnis, should surely have alerted him to the fact that this was a serious matter and he should have endeavoured to make sure that he was fully informed and that he understood what he was being told.

The responsibility for ensuring that the Chairman was properly informed fell squarely upon Couillard, the Assistant General Manager, Products Division. He had himself been furnished with the test results and with the Toxicology Report respecting the known and suspected carcinogenicity of Ethyl Carbamate. He was intimately acquainted with what had taken place in earlier years and with the fact that Baycovin had been removed from the list of permitted additives purely because it apparently produced Ethyl Carbamate. In the opinion of the Commission, the minimum requirement for the discharge of Couillard's responsibility to his employer and to the consuming public was to place before his Chairman the option of reporting the Board's findings to the federal authority thereby giving that authority the opportunity to exercise its own responsibility in an appropriate manner.

Couillard chose to leave Bosworth in ignorance of the real significance of the discoveries that had been made and thereby to deprive him of the chance to make an informed decision. In saying that, I appreciate that material was before Bosworth from which it should have been possible for him to draw the appropriate conclusions. However, I am entirely satisfied that

Couillard knew full well that Bosworth did not appreciate, as Couillard did, the significance of what he was being told.

The policy decided upon at that meeting was Bosworth's, although it certainly agreed with Couillard's views, and looking at it in retrospect Couillard still feels that it was the correct policy under the circumstances.

As to the policy itself, it is sufficient at this point to state merely that the decision was initially to advise Brights of the findings made with respect to their wines and to work with them in an effort to discover the cause and the cure. The decision not to notify the federal authorities, or anyone else, was made because in Couillard's view the resulting publicity would have had a very bad effect upon the industry. He cited the tendency of the media to take an alarmist view and to exaggerate problems such as this, giving as examples the furors that had arisen from the discussion of cyclamates in another industry some years earlier and of asbestos in the wine industry at a later date. In both instances it had subsequently been found that the substances were not harmful in the manner in which they were used and great damage had been done and the public unnecessarily alarmed by sensational reporting.

In addition, Couillard had the recollection of the low key manner in which the matter had been handled by Ottawa in 1972 when DEPC was banned. The substance was withdrawn from the list of permitted additives, but the action was taken only after the winemakers had indicated that it would not seriously affect them and no proposal was made to take products containing DEPC off the shelves. Finally, Couillard had in mind that so far as he was aware no other authority in the world had banned any product specifically because of the presence of Ethyl Carbamate, and he was not aware of any place in which research was being done on it in connection with wine even though many countries were bigger wine producers than Ontario or Canada as a whole. For all these reasons he felt that the matter was not one requiring urgent action by the federal authorities, and he preferred to work quietly with the winemakers in finding a solution. He considered that the appropriate time to report to the federal authorities would be when that had occurred.

In assessing the propriety of Couillard's actions, it must in fairness be pointed out that when the federal authorities did fix permissible levels in consequence of the events that led to the appointment of this Commission, they did so in a manner that took into account very large safety factors and maximum lifetime consumption by any individual as the standard to apply. In other words, with very few exceptions, the readings that have been found and documented by the L.C.B.O. have been far below anything that would represent an immediate toxic hazard and would only be dangerous for human consumption if such consumption were continued on a daily basis for a lifetime.

The net effect, therefore, is that it is unlikely that Couillard's decision and the Board's policy of confidentiality adversely affected the health of any individual. The fact is, however, that the decision to adopt that policy was one that should not have been made by the L.C.B.O. or any of its officers but by the qualified federal authority for the regulation of food and drink from the point of view of the health and safety of the consumer.

MONITORING ETHYL CARBAMATE

Appendix II is a condensed chronology of events relating to the finding and monitoring of Ethyl Carbamate. While this report has described in some detail the events preceding the meeting with Bosworth, the subsequent action taken is clearly indicated by the chronology itself and this report will comment only on certain of the subsequent events.

Following Bosworth's call to the President of Brights' winery, a meeting was held on May 12, 1982, in the L.C.B.O. Board Room and the reports placed before the representatives of Brights.

Brights had in fact been using urea in the production of certain of their wines and by the day following the meeting they were virtually satisfied that that substance was the source of their problem. Arrangements were made, and subsequently carried out, to deliver samples of wine prepared with and without urea to the L.C.B.O. lab for analysis. During the remaining time under consideration, good liaison was maintained with Brights and there was complete co-operation by that company with the laboratory, both under Clarke and under Parker. Certain new products submitted for acceptance were rejected because of high E.C. content but old products were not withdrawn from sale.

On May 28, 1982, Clarke hand drafted a list of possible actions to be taken in order to track down the source of the offending substance. This appears to be a memo to clarify his own thinking only. On June 22, 1982, Clarke drafted a proposal for a series of "retirement projects" which he might be employed to perform or to supervise in the capacity of consultant after his retirement. The proposal was revised, typed and given to Mr. Couillard for submission to the Board. No specific reference is made to Ethyl Carbamate but the first and major project outlined has to do with "harmful substances in wine, beer and spirits." It is worth setting out a portion of paragraph 1 of the memo as it gives a clear indication that, even though the specific substance is not mentioned, Clarke was aware of the problem and of the steps that had to be taken to eliminate it.

> 1.1 At the present time we are involved in a major project regarding the status of contamination in wine. The problems to be solved now that the amount contained has been established is:
>
> 1.11 to discover and remove the cause;
>
> 1.12 to provide alternate safe manufacturing practices;
>
> 1.13 to research methods of removing the substances from current stocks;
>
> 1.14 to discuss methods of ensuring that it will not occur in the whole industry.
>
> And finally to give assurance that it is no longer in the wines affected.

Clarke goes on to give an outline of additional projects in the area of harmful substances that could be carried out. Finally, he indicates the financial terms which he would consider appropriate to his retention and comments that "the contamination of wine is a project of incalculable benefit to the wine-consuming public."

In his testimony, Couillard indicated that he forwarded this memorandum to Mr. Bosworth with a supporting memorandum from himself recommending the project. While that memorandum has not turned up in the course of the Commission's investigations, the fact that it was sent is attested to by a memo of acknowledgement from Bosworth which commences, "I have considered your recommendation concerning possible projects for Perc Clarke after his retirement in September." Ultimately, Bosworth forwarded a further memo stating that the Board had decided not to go on with the retirement project.

Even though the substance, "Ethyl Carbamate", is not identified in Clarke's memo, if it in fact reached Bosworth as I have concluded it did, the reference to the "major project regarding the staus of contamination in wine" should further have alerted Bosworth to the Ethyl Carbamate problem, or at least excited his curiosity.

Mr. Clarke's retirement was due on September 30, 1982. In addition to supervising the testing that was going on in the L.C.B.O. laboratory and the liaison with Brights' winery, he took certain other steps regarding the Ethyl Carbamate problem. On August 26, 1982, by means of a memo headed "Re Polluted Wine" he suggested to Couillard that the official position of the Board "regarding the presence of toxic or cancer-producing constituents in wine" should be clarified and protected by sending a letter, perhaps from the Legal Department, to the producer of the offending product indicating that it was not Board policy to accept such polluted products and proof of action to correct the problem would be required before future shipments would be accepted. Couillard made no response to this memo.

Parker, the new Director of the lab, discovered the Ethyl Carbamate situation in November of 1982 by virtue of conversation with Mr. Karumanchiri. The latter told him a little bit about Ethyl Carbamate, including the fact that he, Karumanchiri, had actually made Ethyl Carbamate by heating urea and alcohol in the lab and that E.C. was found in Brights' wines and that he had been working with Brights on the solution.

Parker first went to the Merck Index and noted the description of Ethyl Carbamate and that it was a carcinogen. He then started to go through Clarke's files and found a few documents bearing on the problem. Amongst them was a copy of the memorandum of August 26, 1982, from Clarke to Couillard regarding polluted wine.

After he had accumulated such data as he could find, Parker drew up in longhand a memorandum outlining possible steps to be taken, which memorandum was subsequently referred to as his brainstorming plan, and filed as Exhibit 75. Following his discussion with Karumanchiri, he realized that the probable agent was urea and that by far the greatest proportion of wines in which E.C. had been found were ports or sherries, wines which were fortified and which were heated in the process, referred to as baked wines.

His "brainstorm memo" started with two proposals for action; namely, advising all Ontario wineries not to use urea and confining the L.C.B.O. analyses to Ontario ports and sherries, where the major problem area appeared to lie.

He then proposed that there should be a meeting with Ontario wineries producing ports and sherries and he listed several of these.

He then noted that acceptable levels should be set for ports and sherries, including a timetable for the reduction of levels to these values after one year and after two years. He asked himself the question as to what wineries were to do with old stock. He noted that the lab should try to keep up with the sample load and that this would take the full time of two people if 5-6 samples per day were to be done, and that if more samples were required, some other analyses should be stopped in order to free the time.

The final paragraph on that memorandum bore the heading "Assess Results" and then two numbered sentences:

> 1. Advise Health Protection if levels remain at 100 plus (we are able to take the soln. only so far but the levels are much lower than 5000 plus).

and:

> 2. No advise if soln. found.

He notes also that there must be other sources of E.C. including fungicides and pesticides out of the Board's control and relating to Federal matters.

In his testimony, Mr. Parker agreed that the final paragraph indicated that, if the levels could not be brought below 100, they should consider advising the Federal Health Protection Branch but that it would not be necessary if a complete solution were found. He also was reminding himself that there were probably other sources of E.C. and such things as fungicides and pesticides were beyond the control of the lab.

On the back of the same sheet Parker apparently summarized the ideas outlined above because he wrote the following:

> 1. Work at things we can control.

2. Advise Health Protection Branch on things we cannot control.

   We should advise them eventually.

   A. Best after the Ontario soln. has been resolved.

Mr. Parker in his testimony stated frankly that when he had considered all these matters, he was uncertain what he should do and he arranged for a meeting with Mr. Couillard. In late December of 1982 or the beginning of January 1983 the meeting took place. Mr. Parker testified that he indicated to Couillard that the federal people, meaning the Deparment of Health and Welfare, should really be brought into the question. Couillard indicated to Parker that he should not advise them of the problem, that it would only become a political football and, in any case, in Couillard's opinion, Parker testified, "The products would be flushed through the system in one or two years at the most", and meanwhile Parker was to monitor the levels of ports and sherries in Ontario, that strict secrecy was to be observed and that Couillard, Bosworth, Parker and the lab people involved were the only ones who knew about Ethyl Carbamate in Ontario wines.

Parker stated that after this conversation the policy of secrecy did make sense to him because no one knew the whole picture or how extensive the problem was at that time.

By January 12, 1983, Parker had an opportunity to give further thought to the problem and he sent a memorandum of that date to Couillard headed "Re Ethyl Carbamate (E.C.)." He reported that Brights had submitted six samples for analysis, that they had been made without the use of urea and they contained less than 0.01 ppm of Ethyl Carbamate. He stated further that such wines would be used for blending to reduce the E.C. levels of the wines Brights had on hand and about 85% of the stock Brights had on hand would be exhausted by the next vintage (or harvest). He added that "it will, however, take 2-3 years to deplete some ports and sherries."

He went on to indicate that the lab's 1983 analysis routine would include the determination of E.C. in ports and sherries and that selected table wines would also be analyzed "to cover wineries without a port and sherry listing."

Paragraph 3 is of significance and read as follows:

> In the interim, Ontario wineries should be advised at the highest management level that the use of urea may result in the formation of E.C. in wine and that E.C. is a known carcinogen. We should require a declaration from each winery advising the Board whether or not urea is used and if it is employed a statement of their intention to cease. The on-going analysis of Ontario wine will indicate the veracity of these declarations.

The memo went on to state that as time permitted imported ports and sherries would also be analyzed and Mr. Couillard would be advised of results.

The suggestion that Ontario wineries should be advised and a statement of intention to cease the use of urea obtained was not adopted by Mr. Couillard.

The suggestion made by Parker during his meeting with Couillard that the federal authorities should be informed was also turned down. Parker testified that, "I wanted to consult with the Health and Welfare but I was forbidden to by Mr. Couillard." Confronted with this testimony, Mr. Couillard told the Commission, "Well, forbidden is a strong word, but I dare say that was the advice. I said that we should not take it up with the Food and Drug Directorate until we had more information."

At and following the time of this conversation and the memo referred to, there was constant communication with Brights and the testing was proceeding.

Meanwhile, the laboratory was systematically testing all Ontario ports and sherries, some occasional table wines and some imported ports and sherries for E.C. Mr. Parker commenced to make careful notes for his own records of what the lab was finding and he kept separate files in which were listed the specific findings with respect to the products of each Ontario winery tested, as he obtained them from Karumanchiri from time to time.

On March 24, 1983, Parker forwarded a memorandum to Couillard indicating completion of the analysis of a selection of ports and sherries put out by London Wines and Chateau-Gai and listed the results. The Ethyl Carbamate was relatively low with respect to all of them and Parker includes the comment, "To date, the levels found in this 1983 survey are much less than the 1982 analysis of Brights."

Couillard felt, no doubt properly, that no particular action was required as a result of this report.

On June 20, 1983, Parker sent a further memorandum to Couillard dealing with an analysis of Barnes' ports and sherries. Of these, which were six in number, one showed 11 ppb, four ranged between 269 and 429 ppb and one showed a concentration of 4,190 ppb. The balance of the memo read as follows:

> The values have been confirmed by repeat analysis on new bottles. The upper limit for this compound has not been set but should be in the neighbourhood of 10 ppb.
>
> Evidence indicates that the high values are due to the use of urea as a yeast food. The use of heat in manufacture of certain ports and sherries also results in the increase [sic] formation of Ethyl Carbamate. Other sources of nitrogen as a yeast food are available and will not form Ethyl Carbamate with use.
>
> If you wish, I can talk to the winemaker at Barnes.

In his testimony, Mr. Couillard admitted that as the problem was now shown to exist in another place, after more than a year's correspondence and testing with Brights, the matter was serious, but he decided to instruct Parker to do as he suggested and communicate with Mr. Opdam, the winemaker at Barnes.

Here was another opportunity to share the information that a serious problem had arisen and to give all those manufacturers who might be concerned an opportunity to share in the solution. This course obviously occurred to Couillard because on the day following receipt of the memo indicating the extent of the problem at Barnes, namely June 21, 1983, he drafted a letter with the intention of sending it to the Chief Executive of each of the Ontario wineries. The draft, including certain handwritten corrections made by Mr. Couillard, is here reproduced in full as it presents so completely an alternative way of dealing with the problem.

DRAFT

June 21, 1983

Dear Sir:

Our laboratory has been analyzing wines, spirits and beers to detect the presence of ethyl carbamate. The detection limit was established at 10 mic. g/L. (10 parts per billion).

Carcinogenicity of ethyl carbamate has been assessed and documented since 1977. You will remember that the suspected contamination of wine by ethyl carbamate, at levels as low as 10 mic. g/L, resulted in the worldwide prohibition of the yeast inhibitor "diethyl pyrocarbonat" (trade name Baycovin).

We have determined that the use of urea as a yeast food produces high values of ethyl carbamate. This fact is evidenced by experiments conducted by our laboratory and one Ontario winery.

In view of the above, I must prohibit the use of urea in the production of wine in Ontario, effective immediately. E.A. Parker, LCBO Director of Laboratory Services, will contact your winemaker in the near future to discuss this subject.

> Will you please inform me in writing, at the earliest opportunity, that neither urea nor any product containing any amount of urea will be used in the production of wine by your company.
>
> This subject is of a highly confidential nature and must be dealt with in strict confidence.
>
> Yours very truly,
>
> J.K. Couillard
>
> JKC/wm

The letter was never sent. Couillard stated in his testimony that upon reflection he thought that letters addressed to the Chief Executives would pass through many hands in the course of distribution in the respective wineries, that confidentiality would thus be lost and that it would be better to continue dealing with the problem with the individual wineries as it developed.

At least two senior executives from the wineries who appeared before the Commission expressed the view that, if something similar to the letter had been sent, the result might well have been the formation of a committee or task force by the wineries themselves and the avoidance of all need for such an Inquiry as this one.

The chronology indicates some of the details regarding the communications between Parker, Couillard and some of the wineries from time to time. It indicates also that Couillard's decision that Parker should discuss these matters with the various winemakers himself, was communicated to Parker. By July 25, 1983, Parker told Couillard that Andres, Barnes, Brights, Chateau-Gai, Jordan and London had been advised not to use urea. Parker had in fact been told by the winemaker at London winery and at Chateau-Gai that those companies did not use urea and he had been advised that Andres had used urea in some wines and that Jordan's had not used it since 1979.

While Parker kept meticulous records of the test results that were being obtained by Karumanchiri in the lab, he did not systematically report these to Couillard, having gained the impression that Couillard only wished to be advised when excessive readings were found in applications for new listings.

In April 1983, Brights made an application for a new Select Dry Sherry and, although they had been co-operating fully and working to reduce the E.C. readings in their products, this submission was analytically unacceptable and contained a high level of Ethyl Carbamate. Brights had been advised of the problem, of course, and at least knew how to approach it when this reading was obtained.

In June, however, the London winery made application for a listing of a special Christmas product known as London Dry Sherry and, although this was accepted by the Listing Committee and the usual notification of acceptance sent by Mr. Flett, the laboratory reported a very high level of Ethyl Carbamate and Mr. Parker reported this to Couillard. Couillard himself telephoned Mr. Knowles of London, advised him that the product was unacceptable and told him for the first time that Ethyl Carbamate had been found at a high level.

The decision of the Board through Couillard to work exclusively and confidentially with Brights resulted in an unfair burden being placed upon the other wineries. The Board had decided to refuse new product listings with high levels of Ethyl Carbamate, but none of the winemakers other than Brights knew that Ethyl Carbamate was a problem, let alone that its presence would disqualify their products.

Parker, therefore, communicated in some way with the winemakers of all the major wineries and meanwhile was keeping careful records of the testing results that were being obtained. However, it was not until December 23, 1983, when Mr. Sing Gen was contacted by telephone that a systematic program was begun with another winery, Jordan's. This was the result of a very high level of Ethyl Carbamate being detected in a new submission for that winery's Select Dry Sherry. Mr. Parker's records appear to indicate that high levels were being found in tests made in October, 1983, but I accept the evidence of Mr. Sing Gen and Mr. Rylko that their first information was obtained from Mr. Couillard on December 22nd when he telephoned Mr. Rylko, Vice-President of Jordan's, who promptly agreed to withdraw the product from sale in the company's wine stores. Jordan's quite promptly arranged a meeting with Mr. Parker who advised them that the E.C. matter was very confidential, that this test of their product was part of a preliminary investigation, that upper limits would possibly be set at 100 parts per billion, and that Mr. Couillard would be advising presidents of the companies concerned. Meanwhile, new listings containing unacceptable levels of Ethyl Carbamate would not be permitted.

Jordan's began a systematic program for testing and verifying the E.C. content of their own products and remained in touch with Parker from this time on, but not continuously, as will appear below.

Although Jordan's winery seems to have carried on the most systematic and serious investigation of the cause of Ethyl Carbamate at high levels in their wines, the very fact that they had decided to take the matter so seriously led to what seemed to Parker to be a lack of co-operation. Parker, with the very proper scientific principle in mind that nothing should be taken for granted, still considered that there might be other causes for the presence of Ethyl Carbamate in wine having nothing to do with urea but possibly related to other nitrogen-bearing substances. Consequently, he requested the winemaker at Jordan's to submit samples of wines prepared with the assistance of diammonium phosphate rather than urea, and these were not sent promptly. The reason for the delay in sending these and other samples was that Jordan decided as a deliberate policy that tests should be made by some other qualified laboratory and that there was no particular point in continuing to rely exclusively on the L.C.B.O. data. Hence, Mr. Sing Gen, the co-ordinator of the Jordan's team working on the project, was advised by his superiors not to forward samples to the Board but to concentrate on his efforts to have another lab develop test results that could be compared.

One result was that in April or May of 1985 Parker told Flett, Vice-President, Products Administration since late in 1984, that he was unhappy with the co-operation he was obtaining from some of the wineries and that he thought perhaps the Board should be taking a harder line with those concerned.

Flett told Parker that he would have to have something in writing before he could take the matter up with his superiors, as he did not have sufficient understanding of the issue. This encounter does not seem to have stimulated Flett to review the "Beta File" which he had been handed by Couillard.

Parker acknowledges procrastination in this matter. In addition, very shortly thereafter, the lab became urgently concerned with the Diethylene Glycol issue, dealt with elsewhere in this Report. That issue indirectly triggered the action Parker next took by reason of a memorandum from Ackroyd, the Chairman.

On November 1st, Parker again said to Flett that he wanted to discuss the subject of Ethyl Carbamate with him and Flett responded that he should wait until after the meeting they were both about to attend. During the course of that meeting, word apparently was received that Mr. Ackroyd had issued a memorandum requiring that the Executive Directors should be notified at once if any problems arose respecting health hazards in any product. At the end of the meeting, Parker again went to Flett, told him he had concerns about the levels of Ethyl Carbamate that were being found and asked him if he thought the Chairman knew about the problem with Ethyl Carbamate. Parker testified that Flett then took out of his desk the Beta File, leafed through it and stated that he did not think the Chairman knew.

While it may not be a matter of fundamental importance, it should be stated that in an original written statement, made on November 18, 1985, and produced by the Board's counsel, Mr. Flett stated that he looked at the Beta File for the first time since he had received it in 1984 during the afternoon of November 6, 1985, following the meeting that Mr. Ackroyd had with the Premier of Ontario earlier that day. In his testimony before the Commission, Flett revised this to state that he in fact took out the Beta file and leafed through it on November 5th when Parker and Karumanchiri brought to him the memos they had prepared as a result of the Ackroyd memo and Flett's statement to Parker that he wanted something in writing. Flett also testified that in a brief meeting with Ackroyd on November 1st, as a result of Parker's oral expression of concern to Flett and Ackroyd's inquiry as to health-threatening substances, he asked Ackroyd if he knew about the Ethyl Carbamate question. Ackroyd responded that he did not and Flett stated that there would be something coming up from the lab. This may explain Parker's statement that Flett thought the Chairman did not know about Ethyl Carbamate, but if the meeting with Ackroyd had been the source of that opinion Flett surely would have stated positively that Ackroyd was not aware. In this matter, I think Flett's recollection was faulty and that Parker was correct in his statement that Flett referred to the Beta File and from that concluded that Ackroyd was not aware of the problem.

At any rate, following Flett's request to put it in writing and Ackroyd's memorandum, Parker showed Karumanchiri the Ackroyd memo and told him that he should be aware of the request. One reason was that Karumanchiri is in charge on occasions when Parker is absent and Parker felt Karumanchiri should be aware of the Ackroyd memo. In addition, he told Karumanchiri that he, Parker, proposed to write Flett a letter regarding his concerns about the continuing high levels of Ethyl Carbamate and he invited Karumanchiri to do the same.

Parker then prepared the memorandum, Exhibit 71, and Karumanchiri prepared his own memorandum, Exhibit 52, and on November 5th both men requested an appointment with Flett and laid the memoranda before him.

Mr. Karumanchiri testified that, as a result of the memorandum from Mr. Ackroyd, he, Karumanchiri, stated to Parker that he would have to report the Ethyl Carbamate problem to the Chairman. Parker responded that he was writing a letter to Flett, his immediate superior, and suggested that Karumanchiri do the same. Karumanchiri followed the suggestion.

It was late afternoon when Parker and Karumanchiri placed their reports before Flett. Flett had to leave shortly thereafter for an urgent personal appointment, but he believes that the meeting lasted perhaps half an hour to 45 minutes and that during that time he made an attempt to find out, by consulting the Beta File, who else in the organization had any knowledge of the Ethyl Carbamate problem.

Because of time constraints, Flett merely skimmed the Parker and Karumanchiri memos but placed them in his briefcase and took them home and read them during the course of that evening. Flett testified that, "...as I read through them, it became fairly apparent that this was a serious issue." The fact that the Vice-President, Products Division, only entertained such a thought for the first time on November 5, 1985, speaks eloquently of the breakdown in communications that was the primary reason for the need to appoint the present Commission.

Flett realized at once that Mr. Ackroyd must be informed and at the first opportunity the next morning he arranged a meeting, showed him the files, and a call from Ackroyd to the office of the Minister followed almost immediately.

The Karumanchiri and Parker memoranda were not only the documents that ultimately triggered the Inquiry, but they say a great deal about the entire history of the matter and the way in which monitoring was conducted, and they are therefore found together as Appendix IV to this Report.

DIETHYLENE GLYCOL

The Commission is specifically instructed to examine and report on the circumstances surrounding any finding of Diethylene Glycol in liquor sold by the L.C.B.O. and the information and marketing practices of the Board with respect thereto.

This was a matter that gave rise to considerable media and public concern during 1985.

Prior to July 11, 1985, the L.C.B.O. lab had not tested for Diethylene Glycol (DEG). It is a toxic substance most frequently used in commercial anti-freeze. On July 11, 1985, Mr. Parker received a telephone call from an official of the Manitoba Liquor Control Board, with whom he was on friendly personal terms, advising him that the Manitoba official had information to the effect that two brands of Austrian wines provided by a certain supplier were contaminated by DEG and asking Parker whether he had any information about the problem. Parker advised that he had none, but he immediately requested Karumanchiri to devise a suitable test for this substance.

On July 12th, a telex was received from the Manitoba Board advising that information had been received from the Health Protection Branch of the Federal Department of Health, and as a result the Manitoba Board had temporarily withdrawn from sale all Austrian wines. There was attached a lengthy press release datelined Mainz, Germany, to the effect that German health officials had confiscated hundreds of thousands of litres of Austrian wine "because it could contain a deadly chemical used to make antifreeze."

As soon as Parker had received the telephone call on July 11th, he looked up DEG in the Merck

Index. He found that it was there stated that the substance was used as a solvent for the gluing of composition corks, and Mr. Parker initially concluded that corks might well be the source of the contamination. In the result, it developed that certain manufacturers were deliberately adding the substance as a sweetener.

Among the products mentioned in the telephone call from Manitoba, the only one listed and sold by the L.C.B.O. was a wine known as Magic Flute, made by a producer in Germany called Morandell. On July 12th, Mr. Karumanchiri, who is fluent in German, called the manufacturer long distance and asked if they added DEG and was advised that they did not.

Meanwhile, as there had been media enquiry, a meeting was held between Mr. Jackman, Executive Vice-President of Operations, Chris Layton, L.C.B.O. Communications Officer, Parker, and Mrs. Hartley, in charge of Products Administration. Parker advised Jackman of the toxic nature of DEG and Jackman authorized the removal from the shelves of the L.C.B.O. stores of Magic Flute, and also of another product of the same manufacturer carried only in the Vintages outlets. The supplier was immediately advised of this action by Mrs. Hartley. The Deputy Minister, Don Crosbie, was advised by Executive Vice-President, MacInnes and the general public were advised by means of a press release, which included the advice that any bottle that had been purchased and was still on private shelves should be retained until tests could be made.

By late on July 12th, Karumanchiri had not only developed a method but had prepared a sample and had tested it. As a result, it was found that Magic Flute was free of DEG.

On July 15th the stores were advised that the product could be restored to the shelves and sold, and the public was advised, again by a press release, that Magic Flute was indeed not a tainted wine.

An immediate program for testing Austrian and German wines was commenced and close touch was kept with the federal authorities, despite the fact that they had not initially advised the L.C.B.O. of the information they had obtained from Germany.

During the course of this program a new submission from an Austrian supplier was received. The tests to which it was subjected included screening for DEG; the result was positive and the product was rejected and never reached L.C.B.O. warehouses.

No other contaminated Austrian or German wines were found amongst the brands carried by the L.C.B.O. However, early in October a suspicion arose that certain Italian wines might be contaminated. On October 8th a representative of Carrington Imports, agent for an Italian supplier, advised Mrs. Hartley that he had received a communication from the Italian supplier Dogliani stating that small amounts of DEG had been found in some of their wines in England. On or about the same date Mr. Parker saw a news release from the United States which included a list of wines in which DEG had been found and that list included four wines stocked by the L.C.B.O.

On October 8th Mrs. Hartley circularized all store managers, instructing them to remove from sale the two Dogliani products that were generally listed, and she caused samples from the two products carried by the Vintages stores to be sent immediately to the laboratory.

On October 9th Mr. Karumanchiri forwarded to Mrs. Hartley a report that the two brands taken from the Vintages shelves were found to "show possible low level (less than 50 mg/litre) contamination of Diethylene Glycol." Accordingly, the products were removed from store shelves. The Health Protection Branch of the Federal Department of Health agreed to do confirmatory analyses of the relevant samples and these were expected to take several weeks.

On November 6th Mr. Parker advised Mrs. Hartley by memo that the presence of DEG in all four of the Dogliani wines had been confirmed by the Health Protection Branch. On November 7th the lab reported that a new shipment of one of of these products had been tested and found to be free of contamination by DEG.

The findings were communicated to the producer, Dogliani, and the agent, Carrington Imports, and on November 14th the L.C.B.O. received permission to destroy all contaminated stocks of these four wines. Instructions to this effect were issued to the warehouses and stores.

In the case of the Italian Dogliani wines it is apparent that, upon notification of possible contamination, the products were immediately put on hold throughout the Province and samples sent to the lab for testing. They were found by the L.C.B.O. lab to be apparently contaminated, but confirmation from the independent facilities of the Federal Department of Health was not obtainable for several weeks. Upon receipt of confirmation, the suppliers were immediately informed and instructions were issued promptly to destroy the contaminated product. The public was not informed during the period that these wines were kept on hold and before confirmation was obtained from the federal authorities. During the same period, no notice was given to the Minister of Consumer and Commercial Relations, under whose supervision the Board falls. When word of the contamination reached the Minister, through enquiries made by the media, he expressed disapproval of the fact that the public had not been advised during the interim while the testing was proceeding, and on October 31st instructed the Chairman to bring all findings of contamination to his attention.

In the course of her testimony, Mrs. Hartley was asked about the reasons for not advising the public, and she pointed out the dilemma with which the Board can be faced in such a situation when contamination is suspected but not firmly established. She pointed to the Magic Flute as an example. Notice had been given to the public as soon as the allegation was received that this product might contain DEG in unacceptable levels. Very shortly thereafter, the Board's testing procedure established that no such levels were present and the wine was not contaminated. Nevertheless, so far as the producer was concerned the damage had been done and, according to Mrs. Hartley, the wine was no longer saleable in Ontario.

Again, following the publication after November 5, 1985, of lists of products in which Ethyl Carbamate had been found, a similar result followed. Barbados Rum had been included in one of those lists. Shortly thereafter, it was found that a solvent used in the course of the test had been contaminated and that the rum itself was not. An immediate statement clearing the rum was issued, but the repercussions echoed throughout the Caribbean rum-producing region and the sales of that particular rum were allegedly damaged in markets extending far beyond Ontario.

As will be mentioned in the recommendations section of this Report, the Board has now established a definite procedure designed to ensure that suspected products are immediately put on hold, that confirmation of test results is sought as promptly as possible, and that upon confirmation the products are removed and destroyed or otherwise dealt with. If the suspected substance is known to be highly toxic, or if test results cannot be quickly obtained, the public will be advised. If only mild toxicity is suspected, and confirmation has not been obtained, the policy will be to withhold public notice pending confirmation.

In passing, it is interesting to note that one of the results of the information concerning the Italian wines reaching the Minister was Mr. Ackroyd's memo of November 1st to Parker, as director of the lab, requiring him to ensure that the Executive Directors' Committee was notified if any additives were found in any product that could affect the health or safety of people. This memo, of course, triggered the action of Parker and Karumanchiri in going to Flett, and the subsequent report to the Chairman and by him to the Minister concerning the presence of Ethyl Carbamate.

GENERAL OBSERVATIONS

The specific conclusions and recommendations that follow should be considered in the light of the knowledge that the L.C.B.O., under its present Chairman, has partially completed a thorough analysis of its function, objectives, methods and organization.

The general view of the Commission, as will have already become apparent from earlier sections of this Report, is that the L.C.B.O. laboratory has demonstrated a high standard of excellence and that the primary reason for most of the problems that have been examined was the lack of firm, well understood administrative policies and, above all, inadequate communications, internal and external.

Underlying those failures was a lack of appreciation of the importance of the laboratory function as a major component of quality control, a failure no doubt brought about by the preoccupation of the Board with its marketing function. Even when it was decided by the present Chairman that the L.C.B.O. should have and should publicize a Statement of Purpose, the Statement adopted made no reference to quality of product. The importance of such a reference is now acknowledged by the Chairman and the Executive Directors have set themselves the task of enunciating a revised Statement.

The reorganization has so far produced firmer lines of authority and communication. The Chairman is also Chief Executive Officer and has replaced the former bottleneck position of General Manager by two Executive Vice-Presidents, Operations and Administration respectively, reporting directly to the Chairman. Each has vice-presidents reporting to him. The Executive Vice-President for Operations receives the reports of D.F. Wilcox, Vice-President, Products/Distribution and R.J. Flett, Vice-President, Retail.

Under Mr. Wilcox, and reporting directly to him, are four Directors, including Mrs. Anne Hartley, Product Listings/Quality Control. Under Mrs. Hartley for reporting purposes are, among others, C. Anderson, Quality Control, and Alan Parker, Laboratory Director. Precise, written procedures have been developed and will be part of an administrative manual which lays down in unequivocal terms the action to be taken and the reports to be made upon discovery by laboratory, store or customer of suspected defective products listed or for which applications for listing are being made. These procedures vary in accordance with whether the suspected defect relates to health-threatening substances, or substances which merely affect quality. The procedures include regular or emergency reports to the Executive-Directors, as well as to the Food and Drugs Act authorities, the Provincial Minister, and the public, in appropriate cases.

CONCLUSIONS RESPECTING THE MATTERS DIRECTED TO BE ENQUIRED INTO BY THE COMMISSION, NOT FULLY DEALT WITH ABOVE

(1) The general practice of the L.C.B.O. between 1975 and the appointment of the Commission was to require each applicant for a new listing with the L.C.B.O. to submit a sample of the product with the application. All samples accepted in principle by the Listing Committee and many samples not yet so accepted were tested by the laboratory for the presence of such substances prohibited by the Food and Drugs Act and Regulations as were likely to be found in the particular type of liquor, and for the presence in quantities exceeding norms established by the laboratory of substances deemed to have an adverse effect upon quality. Unsatisfactory results led to refusal to accept the product, accompanied by a request to submit additional

samples, or to the destruction of the product or its return to the manufacturer if stocks had already been received. Fail-safe procedures were not properly established, with the result that on rare occasions products failing the appropriate tests were nevertheless ordered for general listing or for sale in the Rare Wines or Vintages stores or for private stock.

With respect to products already listed, random samples were taken periodically from L.C.B.O. store shelves, or directly from the suppliers in the case of Ontario wines, and tested.

(2) Specific examples of what followed when substances which ought not to be present were found in liquors have been given in the section dealing with "Laboratory Findings"; the general practice in the case of new products was to advise the agent or the supplier, or both, that the product would not be accepted until new and satisfactory samples had been submitted. The practice developed over time with no written procedures being laid down. Exceptions occurred when orders were placed by those responsible for Rare Wines because they considered that traditional qualities, making the products attractive, outweighed the shortcomings disclosed when quality norms were departed from. Higher management was neither consulted nor made aware when laboratory findings were disregarded.

Occasional purchases of products found to contain excessive quantities of prohibited or health-threatening substances were made for general listing when administrative shortcomings resulted in failure to notify purchasing departments of laboratory findings. Government officials were not informed when unwanted substances were detected, nor were members of the consuming public.

When random testing of products already on L.C.B.O. shelves gave unsatisfactory results, suppliers were generally advised and requested to take any necessary action. Such products were seldom removed from the shelves unless such action was requested by the suppliers.

(3) This term of reference has been sufficiently dealt with in the section on "Laboratory Findings".

(4) Generally speaking, the testing procedures at the L.C.B.O. are well designed and properly carried out. The development of increasingly sophisticated methods and equipment, worldwide, has extended the range of detectable substances and the spread of a consumer movement and of the law governing product liability has made both the consuming public and manufacturers of food products increasingly aware of the possibility of the existence of health-threatening substances in food, including liquor. This inevitably has required and will continue to require screening and testing for an increasing number of substances. In addition, a much greater number of tests will be required from time to time when unexpected discoveries are made, as for example the Ethyl Carbamate and Diethylene Glycol problems.

The on-going and planned enlargement of the L.C.B.O. laboratory, with respect to space, equipment and personnel, is desirable and in the best interests of the consumer. The division into organic and non-organic sections that has taken place, each section in the charge of a supervisor, both of whom report to the Director, but with periodic rotation of personnel, is commended. Proper reporting procedures are essential and for the most part these have now been laid down and will find their place in a new administrative manual. It is proposed that periodic laboratory reports will reach the Executive Directors' Committee, via the established chain of authority, Product Listings and Quality Control Director, Vice-President, Products/Distribution, and Executive Vice-President, Operations. This should ensure that routine quality control problems are brought to the attention of top management without unreasonable delay.

However, the organization should provide for direct access to the Chairman, or when available the Executive Directors' Committee, by the Director of the laboratory whenever evidence of the presence of life-threatening or imminently health-threatening substances is detected.

Unequivocal written procedures have now been incorporated into the administrative manual which provide for the course to be followed when contaminants are found. They provide for immediate notification of the Health Protection Branch, Department of Health, and a request for confirmation when food and drug regulations are apparently breached, or health-threatening substances are found, and for withholding of the products from sale meanwhile. Upon confirmation by the Health Protection Branch, the public will at once be notified by means of press releases to the major news services and to the Queens Park Press Gallery.

In the case of highly dangerous substances, the Director, Product Listings/Quality Control and the Vice-President, Products/Distribution, will be expected to use their judgment as to notification of the public when confirmation may be delayed.

In the case of a failure to comply with norms which does not amount to a threat to health, the product will be withheld from sale pending the submission of satisfactory samples, and the manufacturer will be advised of the failure and the reason for it.

It is recommended by the Commission that no product which transgresses the established norms should be permitted to be sold without the express authorization of a vice-president. When a laboratory recommendation or finding is thus disregarded, the Chairman and the Executive Directors' Committee should be immediately advised.

It is recommended that the review of norms and of substances to be tested for, which has been commenced, be continued and vigorously pressed. To the greatest extent possible, this review should be carried on in consultation with appropriate representatives of the distillery and wine-making industry in Canada, and efforts made to take into account standards set by the World Health Organization and by major wine-making countries throughout the world.

It is recommended that all products, including those contemplated for the special Vintages stores, and for private stock purchased for resale to the public, should be tested and, upon failure, be withheld from sale. In the case of small quantities brought in for private consumption, the importer should be given the opportunity to instruct the L.C.B.O. not to test but such instructions, together with a waiver of his right to have the product tested, should be given in writing and signed by the importer as part of the original order given to the Board.

(5) and (6)

The instructions contained in these Terms of Reference have been at least partly carried out in the sections of this Report dealing with Ethyl Carbamate and with monitoring.

In general, the only effect that the finding of Ethyl Carbamate in various products had upon the marketing practice of the Board was that new listings and new shipments of contaminated products were refused until the contamination had been removed, or brought down to levels deemed acceptable. The practice with respect to information was to withhold information that contamination by Ethyl Carbamate had been found from the Health Protection Branch, the wine and spirits industry as a whole, and all manufacturers, except those large concerns responsible for several contaminated products, who were individually advised of the problem from time to time. Neither the public nor the provincial authorities were advised.

The following observations and findings relate further to Ethyl Carbamate and the monitoring thereof.

When found in various products tested by the laboratory, Ethyl Carbamate was not a banned substance under the Food and Drugs Act, the L.C.B.O. norms, nor under any rule or law worldwide so far as is known. Ethyl Carbamate is a known animal carcinogen, but, although it is treated as a potential carcinogen for humans, no satisfactory evidence that it actually affects humans is known to exist.

It is believed that only very large concentrations are immediately health threatening and consumption over very long periods would be required before serious adverse effects on health would result from ingestion of liquors containing low concentrations of the substance.

The determination of what are permissible levels of potentially health-threatening substances in food products in Canada is the responsibility of the federal authority, carried out by the Health Protection Branch of the Department of Health. The protection of consumer interests generally, in this Province, is undertaken by the Ministry of Consumer and Commercial Relations of the Government of Ontario.

The conflict between the duty to protect the public health and safety and the duty not to damage the business of producers operating in good faith is a difficult one to resolve. In the Commission's view, it must invariably be resolved in favour of protecting the public health.

In the light of the above, the Commission has reached the following conclusions:

(a) Clarke should have advised Couillard that testing for Ethyl Carbamate was going on, even before the formidable amount of data found in the Interim Report of Karumanchiri was assembled;

(b) Couillard should have made certain that Bosworth understood the implications of what was being reported, with particular regard to the cancer-causing possibilities;

(c) Couillard should have kept Bosworth informed of the subsequent developments as tests continued and monitoring was carried out;

(d) Clarke should have advised Parker, when he succeeded to the position of Director of the laboratory, that the problem existed, and should have brought him up to date on the progress of tests and investigations being made, then on-going with Brights Winery;

(e) Couillard should have taken greater pains to make clear to Flett the nature of the problem and of its serious potential. His failure to do so is consistent, of course, with his original conclusion that the problem was a minor one and his failure to raise the question with the Federal Department of Health under the Food and Drugs Act;

(f) Bosworth should have been able to understand from the information made available to him by Couillard and Clarke that a possibly health-threatening problem existed. He should have acquainted himself with the state of knowledge of the Federal Department of Health. He should have taken steps to ensure that he was kept abreast of developments after the meetings with Brights' technical staff;

(g) Couillard should have taken steps to advise each Ontario winery that the use of urea might result in the formation of Ethyl Carbamate, a known carcinogen, and that wines made with the assistance of urea would not be accepted for listing by the Board. He might well have taken this step on his own initiative, but the receipt of Parker's memo of January 12, 1983, would have been an appropriate occasion for such action.

(7) The circumstances surrounding the finding of Diethylene Glycol in liquor sold by the L.C.B.O. and the information on marketing practices of the Board with respect thereto have been fully detailed in the section entitled "Diethylene Glycol".

(8) As indicated in the Commission's Report dated December 11, 1985, (Appendix I), the Health Protection Branch of the Federal Department of Health has now set guidelines, treated as standards, for permissible levels of Ethyl Carbamate in spirits and wines of different categories. This Commission has no further part to play in that regard. However, it should be emphasized, again, that the levels have been set on the basis of lifetime consumption of the type of spirit or wine indicated, and no level has been set above which a single ingestion or continued ingestion for a short period would be considered dangerous. In addition, that authority has not yet banned the use of urea for wine-making. Although few if any wine makers are prepared to state that urea is the sole cause of Ethyl Carbamate in liquors, the evidence would indicate that it is by far the most common cause of excessive levels.

As to the instruction to report on directions given to Ontario and foreign liquor manufacturers with respect to eliminating Ethyl Carbamate or other substances from liquors, the section of the Report dealing with Monitoring goes some distance towards answering that requirement. It is apparent that only with Brights Winery, and later with Jordan's, did the Board conduct anything like a full and frank exchange of information or give instructions regarding the action to be taken. Even then, the firm instruction which Parker led Jordan to believe would be forthcoming from higher authority was never given. It did eventually instruct all the wine makers in Ontario not to use urea, but none except Brights and ultimately Jordan's were given all the information known to the Board or the findings with respect to the presence of Ethyl Carbamate that had been made by the L.C.B.O. laboratory. The uneven treatment given the wineries in this regard led to justifiable resentment on the part of those who were kept in the dark and who were unknowingly producing products thought to be contaminated. In at least one instance, that of Chateau-Gai Winery, a producer was able to establish that at least the quantitative results of several analyses were in error and that in fact none of its products contained Ethyl Carbamate in excess of the level of 10 parts per billion, treated by the Board as the level below which no accurate results could be obtained and no adverse consequences could be expected.

The Board provided no information whatever to the Wine Institute or any distiller's organization, or any official representative of the liquor industries, other than the individual companies, in the manner indicated.

In one or two instances foreign suppliers were advised that a high E.C. content would render their product unacceptable but no advice was given to suppliers generally that the problem existed, that at least one major cause was known, and that excess levels would result in non-acceptance of products by the L.C.B.O.

One final matter should be mentioned. As a result of the disclosures ultimately made and the involvement of the Health Protection Branch of the Federal Department of Health, a program was negotiated and put in place whereby the task of testing products for Ethyl Carbamate was divided between the Health Protection Branch and the L.C.B.O. laboratory. When Ethyl Carbamate is discovered by the L.C.B.O. in the course of testing, it forwards samples to the Health Protection Branch for confirmation. When confirmation is made, Ottawa now advises the provincial Boards and, where applicable, Embassies of countries from which the tainted products are coming, that action will be necessary with respect to some product or products. Normally, on the next day a further telex specifies the product or products affected and requires that the necessary action be taken to remove the product from sale.

The procedure has been tested on more than one occasion and it appears to be working satisfactorily. There is every reason to hope, and the Commission unhesitatingly recommends, that this process be widened to include the results of testing for all health-threatening substances affected by federal regulations or, for that matter, by provincial norms.

The Commission has no hesitation in commenting favourably upon the proposal of the L.C.B.O. that it establish a regular news letter or other form of internal communication by which its own employees throughout the Province may be kept advised of actions which include the activities of the laboratory and the reasons for the withdrawal of any products from sale. Regular suppliers should be similarly advised. It also seems desirable that, when products are withdrawn from sale, consumers should not only be notified by way of the media but that notices should be posted in all stores carrying the product explaining why the action was taken.

This review has included recommendations for action directly within the power and jurisdiction of the L.C.B.O. It is impossible to conclude without making some suggestions which go beyond the Commission's Terms of Reference because of the breadth of the problems that must be addressed. Throughout the Commission's hearings, and especially when considering some of the final submissions, it was obvious that effective co-operation between the health authorities, the marketing agencies and the manufacturers of alcoholic products was essential. The problem posed by the discovery of Ethyl Carbamate in many products could have been contained, if not immediately solved, in very short order if representative agents of the manufacturers in this country and the Health Protection Branch had been advised of the findings made at an early stage. The question of acceptable standards could have been addressed and the combined expertise of the health authorities, the winemakers and the distillers could have been tapped.

It is strongly recommended that there be established a body or organization representative of the federal health authorities, the consumer authorities in the provincial governments and the distillers, breweries and winemakers of this country, together with the Provincial Liquor Control Boards to consult together on the problem of standards for alcoholic beverages in Canada. Such a body could subsequently act as an information center for the entire industry and it could be developed so as to provide a convenient vehicle for the speedy dissemination of information regarding problems of health or safety, as well as quality standards. As the world's largest purchaser of alcoholic products it would be appropriate for the Liquor Control Board of Ontario to take the initiative in the formation of such a body.

That having been said, it remains the responsibility of the Health Protection Branch to determine what contaminants or foreign substances present in liquors or other foods constitute a danger to health or safety. The liquor industry is entitled to have prohibitions and standards in that respect publicly and clearly stated. It remains the responsibility of the L.C.B.O., because it represents products as being safe by placing them on its shelves for sale, to ensure that such products are free of such substances. It remains the responsibility of each to communicate with the other promptly and invariably when dangers or potential dangers to health are found.

It is the responsibility of each to notify producers who are or may be affected by such findings. It is the responsibility of the L.C.B.O., as well as that of the Health Protection Branch, to notify the public when such findings indicate possibly imminent damage to health. While care must be taken to avoid unnecessary injury to producers, whenever a conflict arises the health and safety of the public must be the paramount consideration.

It was the failure to recognize and adhere to those imperatives that led to the need for this Commission.

APPENDIX I

Ontario

THE ROYAL COMMISSION OF INQUIRY INTO THE
TESTING AND MARKETING OF LIQUOR IN ONTARIO
22nd Floor
180 Dundas Street West
Toronto, Ontario
M5G 1Z8
Telephone: (416) 597-8470

The Honourable Mr.
Justice John Osler
Commissioner

Clay M. Powell, Q.C.
Counsel

Barbara Bogoch
Research Counsel

Thomas B. Millar
Administrator

December 11, 1985

His Honour Lincoln Alexander, Q.C.
Lieutenant Governor of the Province of Ontario
Room 131
Legislative Building
Queen's Park
Toronto, Ontario

Your Honour:

I am pleased to present herewith the first Report of the Commission appointed by OC 2709/85 to inquire into certain matters affecting the practices and procedures of the Liquor Control Board of Ontario.

No. (8) of the Terms of Reference in the said Order is as follows:

> "(8) inquire into, determine on an interim basis and report as soon as possible, on a permissible level of ethyl carbamate in liquors and then to further inquire into, determine and finally report on a permissible level of ethyl carbamate in liquors, provided that no standard for a permissible level is set by a federal authority prior to the interim or final reports required hereby;"

Accordingly, it was determined that public hearings would be held for the purpose of hearing evidence and submissions on the issue of an interim standard for permissible ethyl carbamate levels. A copy of the Notice of Public Hearings published in newspapers in Ontario is annexed hereto as Appendix A.

Hearings commenced on Monday, December 9th and on that day evidence was heard from Diana Kirkpatrick, Acting Director of the Bureau of Chemical Safety, Food Directorate, Health Protection Branch, Health and Welfare Canada, and from Dr. Tibor Kemeny, Scientific Advisor to the Bureau as well as from Dr. Lesbia Smith, Senior Medical Consultant, Environmental Health Toxicology of the Ministry of Health of Ontario. The evidence of all three witnesses focused on the methods for establishing permissible levels of harmful substances in consumable foods.

Counsel for major distilleries and wineries as well as for the Liquor Control Board of Ontario were present and participated in the hearing.

In the course of the day, it developed that by means of a Press Release the Honourable Jake Epp, Minister of Health and Welfare, Canada, had established guidelines to limit the amount of ethyl carbamate in alcoholic beverages as follows: Table Wines - 30 parts per billion (PPB), Fortified Wines (sherries, ports) - 100 PPB, Distilled Spirits - 150 PPB, Fruit Brandies and Liqueurs - 400 PPB.

It was also indicated that in the near future regulatory action which will have the effect of prohibiting the use of urea as a yeast food will shortly be published in Part 1 of the Canada Gazette.

The Commission was not provided with official notice of the action taken, but a copy of a telex message that came into the Commission's hands is annexed as Appendix B.

It is of interest to note that the establishment of separate acceptable levels for the four types of liquors mentioned was considered necessary because the effect of the ingestion of ethyl carbamate is cumulative and there are significant differences in the consumption of each of the types of beverages mentioned.

In view of the explanations furnished in the course of their testimony by the officials who appeared before the Commission, it is my view that in spite of the description of the action taken as "the establishment of guidelines", standards for permissible levels have, in fact, been set by a federal authority so far as the four types of liquors mentioned are concerned. An excerpt of the testimony of Mrs. Kirkpatrick is annexed hereto as Appendix C.

. . 3

The remaining classes of liquors that might be considered to fall within the definition in the Liquor Licence Act of Ontario are beer and products marketed by the Liquor Control Board of Ontario known as coolers. No evidence was tendered that ethyl carbamate has been found in either of these types of liquor. It may be that testing of these varieties has not taken place and, if so, information may be obtained in the course of conducting the inquiries mandated by paragraphs (1) and (4) of the Commission's Terms of Reference.

For the sake of assisting public perception of the dangers to health posed by the presence of ethyl carbamate in liquors, it is worth indicating that the guidelines now adopted by the Department of Health and Welfare, Canada, are set with reference to the cumulative effect of lifetime ingestion of the products. No evidence was received respecting the effects of massive short-term consumption of any of the liquors tested.

In view of the matters described above, I am respectfully of the opinion that the duty mandated by paragraph (8) of the Order in Council has been completed and I respectfully present herewith this first Report.

Yours very truly,

John H. Osler
Commissioner

APPENDIX A

Ex 2

Ontario

The Royal Commission of Inquiry into the Testing and Marketing of Liquor in Ontario

NOTICE OF PUBLIC HEARINGS

By Order in Council dated the 20th day of November, 1985, The Honourable Mr. Justice John Osler was appointed pursuant to the Public Inquiries Act as Commissioner to conduct a judicial inquiry into whether the practices of the Liquor Control Board of Ontario in testing liquors, selling liquors and providing the public with information relating thereto have been in the best interests of the public and, in part, to:

> inquire into, determine on an interim basis and report as soon as possible, on a permissible level of ethyl carbamate in liquors.

NOTICE OF HEARING

Public hearings will commence on **Monday, December 9th, 1985, at 10:00 a.m. in Hearing Room #1, 21st Floor, 180 Dundas Street West, Toronto,** for the purpose of hearing evidence and submissions on the issue of an interim standard for permissible ethyl carbamate levels.

Further hearings relating to other matters of concern to the Commission will be held at a later date at which time everyone will be invited to attend and seek standing or make submissions.

Anyone wishing to be heard or make submissions at the first stage of the Inquiry should immediately contact:

Clay M. Powell, Q.C.
Commission Counsel

at the address or telephone number shown below.

THE ROYAL COMMISSION OF INQUIRY INTO THE TESTING AND MARKETING OF LIQUOR IN ONTARIO
180 Dundas Street West, 22nd Floor,
Toronto, Ontario
M5G 1Z8
Telephone: (416) 597-8470

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APPENDIX B

EX3

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RON FLETT VICE PRESIDENT
PRODUCT DEPT
LIQUOR CONTROL BOARD OF ONTARIO
TEL 963-1073
DDN002 WWWWPAO HPB 54 DEC 06/85 OTTAWA
TX
BT

THIS IS TO ADVISE YOU THAT HEALTH AND WELFARE MINISTER, JAKE EPP, WILL ANNOUNCE ON MONDAY, DECEMBER 09, 1985, THE ESTABLISHMENT OF GUIDELINES TO LIMIT THE AMOUNT OF ETHYL CARBAMATE IN ALCOHOLIC BEVERAGES, AS FOLLOWS: TABLE WINES - 30 PARTS PER BILLION (PPB), FORTIFIED WINES (SHERRIES, PORTS) - 100 PPB, DISTILLED SPIRITS - 150 PPB, FRUIT BRANDIES AND LIQUEURS - 400 PPB.

THE NEED FOR FOUR SEPARATE GUIDELINE LEVELS RATHER THAN ONE ALL-ENCOMPASSING LEVEL IS A REFLECTION OF SIGNIFICANT DIFFERENCES IN THE CONSUMPTION OF EACH OF THESE TYPES OF BEVERAGES.

IN ADDITION, REGULATORY ACTION TO DELIST PROVISIONS FOR THE USE OF UREA AS A YEAST FOOD WILL SHORTLY BE PUBLISHED IN PART 1 OF THE CANADA GAZETTE.

HEALTH PROTECTION BRANCH OFFICIALS WILL BE ESTABLISHING CONTACT WITH ALL CONCERNED RESPECTING THE IMPLEMENTATION AND MONITORING OF THESE GUIDELINES.

J R ELLIOT DIRECTOR GENERAL FIELD OPERATIONS DIRECTORATE
HEALTH PROTECTION BRANCH HEALTH AND WELFARE CANADA
TELEX 053-3679

data available to us are not based on brands, they are based on overall types of products so we basically put them into four categories. The wines, the fortified wines which are the sherries and ports, the distilled spirits and the fruit brandies and liqueurs.

Q. All right. Now you have or we have been provided this morning by the office of the Chairman of the Liquor Control Board is how we got this particular document. If I show it to you, first of all, would you look at it and tell me if you're familiar with that document?

A. Yes, I am.

Q. And in particular, this is a telex to Mr. Ron Flett, Vice-President of the Product Department of the Liquor Control Board of Ontario. And it reads - -"This is to advise you that Health and Welfare Minister Jake Epp will announce on Monday, December 9, 1985 the establishment of guidelines to limit the amount of ethyl carbamate in alcoholic beverages as follows: table wines - 30 parts per billion, fortified wines (sherries, ports) - 100 parts per billion, distilled spirits - 150 parts per billion, fruit brandies and liqueurs - 400 parts per billion. The need for four separate guideline levels rather than one all encompassing level is a reflection of significant differences in the consumption of each of these types of beverages. In addition, regulatory action to delist provisions for the use of urea as a yeast food will shortly be published in

Part One of the Canada Gazette. Health Protection Branch officials will be establishing contact with all concerned respecting the implications and monitor organization of these guidelines. J. R. Elliott, Director General, Field Operations, Director, Health Protection, Branch Health and Welfare Canada". I wonder if I may ask if that could be Exhibit 3.

EXHIBIT NO. 3: Telex dated December 6, 1985.

MR. POWELL: I have some questions, Mrs. Kirkpatrick, about that. Firstly, I notice that the telex itself is dated at the top, December 6 of 1985. Were you aware on December 6th that this telex was going to be sent out?

A. Yes, I was.

Q. Did you take or play some part in the establishment of these levels that are referred to?

A. Yes, I did.

Q. Can you tell me were others involved in arriving at these figures?

A. The people I named originally in my Bureau were all involved in the establishment of these figures and in addition also in my Bureau, Dr. Bev Houston, who is currently acting in my previous position as Acting Chief of Chemical Evaluation Division as well as Mr. John Callmen who is Acting Section Head for Dr. Houston in the Additives and Contaminants Section in that Division, also played a key role in the development of these guidelines.

Q. Can you tell me what it means when you say that the Minister of Health will announce the establishment of guidelines to limit the amount. What exactly does that entail, the establishment of guidelines?

A. Well, the Minister of Health and Welfare under the provisions of the Canada Food and Drug Act and regulations has the authority to establish guidelines pursuant to section 4 of the Act and also can establish regulations pursuant to the Act to limit the occurrence of any substance in food that may pose a hazard to the Canadian population.

Q. Now, is it your understanding that these guidelines are in effect as of today?

A. They will be in effect as soon as our Minister makes the formal announcement of the guidelines and I expect that to be today.

Q. And from a practical point of view, what does that mean. What do your officials have the right to do once those guidelines are set?

A. Well, from a practical point of view, officials of the Health Protection Branch may take action against any product that is found not to comply with those guidelines

Q. - Would that matter whether it is in the Liquor Board or in a restaurant or in a person's home or how does that work?

A. The Food and Drug Act and regulations apply to food sold on the market place. It wouldn't apply to wine in the home, but it would apply to wines sold out of the Liquor Control Boards and wine that would be sold in any other establishment.

Q. Now, in paragraph two of the telex, it sets out that these 4 guidelines are there because they reflect the significant differences in the consumption.

A. That's correct.

Q. I take it then, am I correct, that your findings would indicate that table wines are the most consumed beverage, alcoholic beverage?

A. When you look at the consumption of wine on a per person basis, definitelyit happens to be the item that is consumed to a more significant degree per person.

Q. The fruit brandies and liqueurs at 400 parts per billion as the highest, do you take into account that there might be and element of society that might drink and awful lot of fruit brandy. How do you - -?

A. In our calculations of consumptions, we not only look at mean intakes by the entire population, but we also look at upper percentiles of the population to ensure ourselves that in applying whatever guideline level we're applying that we are covering those who may consume above and beyond the average.

Q. So, do I take it that you're satisfied in any event, that these levels that are being announced today safely protect the drinking population of this country from the potential harm of ethyl carbamate?

A. Yes, I do.

Q. Now, one of the Terms of Reference, Mrs. Kirkpatrick, of our inquiry and in particular this matter that we're looking at today about reporting on a permissible level as soon as possible of ethyl carbamate in liquors and under our Terms of Reference, it is liquor as defined under the Provincial Liquor Licence Act which means spirits, wine and beer. Or any combination thereof and includes any alcohol in a form appropriate for human consumption as a beverage alone or in combination with any other matters so that is what we have to be looking to, so it is spirits, wine and beer.

Spirits appear to be covered at the level of 150. Wine, while under the definition of the Liquor Licence Act isn't broken down, I assume is either fortified wine or table wine depending on how it is sold or what is in it, I guess?

A. Yes.

Q. Beer. Is there any reason from information that you have as to whether or not it is possible that there might be ethyl carbamate in any beer sold in Canada or in Ontario?

A. Well, the elevated levels of ethyl carbamate that have been found to date have been associated with the use of urea as a yeast food in the production of these products. Branch officials did contact the Brewers Association to ascertain whether or not they had information or refer to the use of this yeast nutrient in the manufacture of beer and we were advised that all 8 breweries in the country did not use urea as a yeast food.

In addition we had no data available that indicated elevated levels of ethyl carbamate in beer products and therefore we did not feel it was necessary at this time to establish a level for this substance in beer. We will, of course, as part of our overall assessment of the problem posed by the substance -- we, as well as the brewing industry will sample a number of their products just to confirm that that is the case.

Q. When you say elevated levels, what do you mean by elevated levels?

A. Well, we are aware that ethyl carbamate can occur naturally in yeast products, naturally being there as a result of the occurrence of other substances which can react in the process of making these products and is not there because of the addition of any other substance to the process of making these particular products. So, there is a natural occurrence of the substance in a number of products.

Q. Are we talking above or below a certain level?

A. Well, the information available to us indicates that the natural occurrence is in the range of 10 to 25 parts per billion.

Q. In beer?

A. I have no information on occurrence because measurements have indicated to date, none detected and the detection of the limit was in and around 10 parts per billion with a fairly large variation at that level of detection.

Q. That was my understanding that 10 parts per billion, anything below that is practically impossible to detect?

A. At this time.

Q. At this time and also we may hear reference to the fact that anything above 10 parts per billion - - 10 parts per billion is referred to as a trace, is that correct?

Q. A trace is all relative depending on the sensitivity of the method and if one were to look at many other situations where parts per million were considered trace and later on parts per billion were considered trace and parts per trillion, what it basically means is that the method cannot detect less than that and the natural occurrence was somewhere around the limit - -.

Q. As to ethyl carbamate and the current state of the study of that substance, trace levels are referred to as being 10 parts per billion or less, am I correct?

A. Yes.

APPENDIX II

ETHYL CARBAMATE TEST METHODOLOGY

Mr. Karumanchiri began developing a method to test for Ethyl Carbamate late in 1977. He first reviewed a method developed by scientists in the Food and Drug Administration of the United States (Exhibit 27). Mr. Karumanchiri found this method too complex and time-consuming to be used for routine screening of the numerous products carried by the L.C.B.O. He concluded that it was necessary to modify the method for rapid screening purposes.

The first method was fully developed some time in mid-1978. It was subsequently refined in 1980 as new and more sensitive equipment became available. We will deal first with the 1977/78 method.

The first step in any gas chromatographic procedure is the sample preparation. 100 millilitres of liquor would be pipetted from the bottle and placed in a clean glass tube. To this would be added approximately 50 grams of potassium chloride, enough to saturate the sample and to create some excess precipitate. The potassium chloride served to decrease the solubility of the Ethyl Carbamate in the alcohol water matrix. 150 millilitres of methylene chloride would then be added to the potassium chloride saturated sample of liquor. Methylene chloride is an organic solvent used to extract the Ethyl Carbamate from the liquor. The sample would then be placed on a vortex mixer and shaken until it achieved an homogeneous form. At this point, the sample would have a milky appearance.

The sample would then be placed in a centrifuge balanced with another sample or a test tube containing an equal amount of water. Methylene chloride, the liquor and potassium chloride have different densities. When centrifuged at

5,000 to 6,000 revolutions per minute, the difference in their specific gravities would cause them to separate into three distinct phases. On top would be the liquor, in the middle the methylene chloride containing the Ethyl Carbamate and on the very bottom the potassium chloride in crystalline form.

The two liquid phases would then be poured into a separatory funnel, care being taken to ensure they retained their separation. The potassium chloride crystals remaining in the test tube would then be discarded. The liquor phase would remain at the top of the separatory funnel with the methylene chloride phase beneath it.

A funnel would be positioned in the neck of an evaporation flask. A filter paper would be placed in the funnel and anhydrous sodium sulfate, a white powder, poured into it. The anhydrous sodium sulfate ensured that no trace amounts of water could be retained in the methylene chloride phase when it was passed into the evaporation flask. The stop cock of the separatory filter would then be carefully opened and the methylene chloride phase drained through the anhydrous sodium sulfate and into the flask.

The extraction process would then be repeated using the liquor phase remaining in the separatory funnel. No further amount of potassium chloride would be added as the liquor had already been saturated. However, the same amount of methylene chloride would be added, the mixture shaken, centrifuged and the methylene chloride phase drained through the anhydrous sulfate into the evaporation flask containing the methylene chloride phase from the first extraction of that sample. The purpose of repeating the extraction process was to ensure a good quantitative extraction of Ethyl Carbamate from the sample. The liquor phase remaining in the separatory funnel after the second extraction would then be discarded.

The evaporation flask containing the sample would then be placed in a water bath and attached to a rotary evaporator. Ethyl Carbamate is a volatile substance. By placing the flask in a water bath set at 28° celsius, evaporation of the Ethyl Carbamate was avoided. The sample was passed through the rotary evaporator and reduced in volume from 100 millilitres to 5 millilitres, thereby increasing the concentration of Ethyl Carbamate in the sample twenty-fold.

In 1977/78 Mr. Karumanchiri was using a Hewlett-Packard 5700 gas chromatograph equipped with a packed column and a flame ionization detector. A flame ionization detector cannot be made sensitive to certain types of chemicals only. Therefore, it was necessary to remove as many chemicals as possible from the sample to be tested, a procedure known as a column clean-up, in order to obtain a readable chromatogram. If the column clean-up is not performed, the presence of each chemical in the sample would be recorded by a peak on the chromatogram and the numerous interfering peaks would prevent the identification and quantification of a particular chemical, in this case Ethyl Carbamate.

To perform the column clean-up, glass wool would be placed in the bottom of a short tube or column. A chemical compound to which Ethyl Carbamate was known to adhere would then be placed in this column. The 5 millilitres of sample would be taken from the rotary evaporator and placed in the column. A solvent of methylene chloride containing various concentrations of pentane would then be passed through the sample. At a particular concentration of pentane, a particular group of chemicals would be removed from the sample and thereby eliminated from the analysis. Finally, methylene chloride containing a concentration of pentane known to cause Ethyl Carbamate to elute, or be removed from the column, would be passed through the sample and the column clean-up would be completed.

The cleaned sample would again be placed in the rotary evaporator and reduced to a volume of approximately 5 millilitres, then placed in a small stoppered test tube. The test tube would be placed in a flask set in a water bath again at a temperature of 28° centigrade. Nitrogen would then be bubbled through the sample, through an intake hose, causing the methylene chloride to be removed through an outflow tube attached to a vacuum pump, further reducing the volume of the sample to exactly 1 millilitre. Thus, as the original 100 millilitres of sample had now been reduced to 1 millilitre, a hundred-fold concentration of Ethyl Carbamate had been achieved.

One microlitre of the sample would then be drawn up using a microlitre syringe, and injected into the gas chromatograph. In 1977/78 a packed column served to separate the sample into its individual components and quantitate them. A packed column resembles a coiled cable six feet long and about one-quarter inch in diameter. The column is packed with an inert substance, a diatomaceous earth mined from the ocean bed. An inert substance is one which will not react with any chemical. The inert substance is coated with a waxy material called Carbowax 20M having a molecular weight of 20,000. As each substance passes through the packed column, it will be retained in the column for a certain period of time, dependent upon its physical properties. The length of time each substance remains in the column, known as its retention time, is characteristic.

At the time the sample is injected into the gas chromatograph, the attached chart recorder is started. A stylus is fixed to the gas chromatograph and the chart paper moves beneath it at a set speed. As a substance leaves the packed column, the stylus records a peak on the chart paper. The retention time of that particular substance is determined by measuring the length of paper to the peak, or the horizontal grid, as the paper has passed beneath the stylus at a fixed number of millimeters per minute.

As has been indicated, the identity of a particular substance is determined by its retention time. The quantity of the substance is determined by calculating the area beneath the peak.

In 1977/78 the calculation of the amount of Ethyl Carbamate present was based upon a direct calibration method. A laboratory pure standard of Ethyl Carbamate would be obtained and injected directly into the gas chromatograph. The area under the peak would be measured to establish the area size corresponding to a 100% sample of Ethyl Carbamate. A sample of wine, known to contain no detectable level of Ethyl Carbamate, would then be spiked with the same amount of the laboratory pure standard. This sample would then be prepared in the above manner, analyzed, and the area under the peak measured. As it is not possible to extract 100% of the Ethyl Carbamate present in the sample, the area of the spiked sample would always be smaller than that of the comparative standard. By repeating this process with various amounts of Ethyl Carbamate added to the sample, the percentage of recovery was determined. That is, the percentage of the amount of Ethyl Carbamate actually present in the sample which could be recovered during the sample preparation process would be determined. This was generally between 75% and 85% of the amount of Ethyl Carbamate actually present. Several samples were spiked with various known concentrations of Ethyl Carbamate and graphs were made, reflecting the area beneath the peak in centimetres squared against concentration. The recovery rate would be taken into account in the calibration chart. Thus, the area under the peak on any given sample tested would be calculated and compared to the calibration chart to obtain a figure in parts per billion.

In 1980, a new type of gas chromatograph was purchased by the L.C.B.O. laboratory. This ws a Tracor gas chromatograph equipped with a Hall Detector. A Hall Detector is an extremely sensitive detector which can be made to react only to specific elements present in organic chemicals. For the purpose of Ethyl Carbamate analysis, the Hall Detector had been adjusted to detect only those compounds containing nitrogen. In addition, the Tracor Gas Chromatograph was equipped with a capillary column rather than a packed column. A capillary column resembles a coiled nylon filament and comes in different lengths. The capillary column utilized by Mr. Karumanchiri was some 30 metres long as opposed to the packed column which was only 2 metres in length. A capillary column permits greater separation of chemicals thereby producing a chromatogram with clearer, sharper peaks and decreasing the likelihood of overlapping or interfering peaks leading to erroneous conclusions as to the identity of a particular chemical.

To take advantage of the improved equipment, Mr. Karumanchiri had to make certain alterations in his test methodology. Mr. Karumanchiri had reviewed another method of analysis for Ethyl Carbamate published by Dr. Cornelius Ough of the Department of Viticulture and Oenology at the University of California in Davis, California. Once again, Mr. Karumanchiri found the method too time-consuming and complex for routine screening analyses and he proceeded to modify the test method he had developed earlier.

As with all gas chromatographic procedures, the first step was sample preparation. Due to the increased sensitivity of the Hall Detector, a ten-fold concentration of the sample, rather than the hundred-fold concentration formerly required, was sufficient. Thus, only 10 millilitres of liquor would be placed in a test tube. To this would be added 1 millilitre of an internal standard of nitrobenzine at a level of 1 part per million. The purpose of the addition of the internal standard will be discussed below. A sufficient amount of potassium chloride to saturate the sample, roughly 5 grams, would be added, followed by 15 millilitres of methylene chloride. The sample would then be mixed, centrifuged, and separated in the manner described above. However, as the Hall Detector was set to react only to nitrogen-containing compounds, it was not necessary to perform a column cleanup. Following the two extractions, the sample volume was once again reduced to 5 millilitres using the rotary evaporator. Again, nitrogen was bubbled through the sample further reducing its volume to 1 millilitre, a ten-fold concentration.

At this point, another change in the method was introduced. As the presence of any amount of methylene chloride would destroy a component of the gas chromatograph known as the "scrubber", it was necessary to transfer the Ethyl Carbamate containing extract from methylene chloride to another solvent containing no nitrogen or chlorine. When the sample had been reduced in volume to 1 ml., 1 ml. of hexane, which has a higher boiling point than methylene chloride, would be added to it. The sample would again be attached to the vacuum pump and nitrogen bubbled through it removing the methylene chloride and leaving the Ethyl Carbamate concentrated in one ml. of hexane. The sample would then be ready to be drawn up in the microlitre syringe and injected into the gas chromatograph. The same type of chart recorder was utilized and a similar, if more precise, chromatogram obtained. The identity of a particular chemical was determined by its retention time, as explained above.

The addition of the internal standard, nitrobenzine, required an alteration in the method of calculation of the amount of Ethyl Carbamate present. The standard peak area corresponding to 1 ppm of nitrobenzine was known and served as a constant reference point. If the area of the nitrobenzine peak was larger or smaller than expected, it would indicate that an error in sample preparation or injection into the gas chromatograph had been made. In addition, as the relative retention time between nitrobenzine and Ethyl Carbamate never varies, any slight shifts in the absolute retention time, resulting perhaps from aging of the capillary column, would not result in confusion with respect to whether the particular peak, coming out at a slightly different retention time, indicated the presence of Ethyl Carbamate. As to the calculation itself, rather than merely comparing the peak area for the Ethyl Carbamate to the calibration chart, a ratio of the two peak areas of Ethyl Carbamate and nitrobenzine would be compared. This provided a more accurate assessment of the recovery rate and avoided errors in sample preparation or injection into the gas chromatograph.

The method of analysis for Ethyl Carbamate developed in 1980 and using the capillary column and Hall Detector is the method currently in use in the laboratory at the L.C.B.O. High results are now confirmed by mass spectometry.

The identification of a chemical by gas chromatography is dependent solely upon the retention time. Thus, if another chemical is present in the substance being tested that has the same retention time as the particular chemical one is looking for, there is no way of distinguishing between the two chemicals. The only way of being absolutely certain that a chemical with a specific retention time is the chemical one is seeking and no other, is analysis by mass spectrometry.

A mass spectrometer analyzes the physical and chemical properties of a particular substance and its computer automatically compares this to a mass spectral library containing the mass spectra of 32 to 40 thousand chemicals. A chemical's spectra is unique and has been likened to a fingerprint. It was agreed by all of the chemists testifying before this Commission that G.C.-mass spectrometry is the best method currently available for chemical analysis.

The L.C.B.O. laboratory did not obtain a mass spectrometer until December 1985. Prior to that time, Mr. Karumanchiri had occasional confirmatory analyses performed by mass spectrometry at Mann Testing Laboratories. In each case Mann Laboratories confirmed that the chemical in question was in fact Ethyl Carbamate.

Dr. Pierre Beaumier, Vice-President and Chief Chemist of the Mann Lab, testified that his laboratory is using the Karumanchiri method to test for E.C. and that it is a satisfactory method. He further testified that he was aware that the official federal method utilized sodium chloride rather than potassium chloride as the salt, but that in his experience a better recovery was obtained using potassium chloride.

Following the establishment of Ethyl Carbamate guidelines in December 1985, the Federal Health Protection Branch invited laboratories to engage in a check sample program. Spiked samples, containing known amounts of Ethyl Carbamate were sent to the laboratories for analysis.

The laboratories would then send the results back to Health Protection Branch, which would advise them whether or not the results were satisfactory. The Health Protection Branch developed their own method, which slightly modified the Karumanchiri method. Although the laboratories participating in the check sample program were advised of this method, they were not required to use it so long as their results, using any method, conformed to federal requirements. Mr. Karumanchiri participated in the check sample program, using his own method, with satisfactory results.

APPENDIX III

CHRONOLOGY OF EVENTS RELATING TO THE FINDING AND MONITORING OF ETHYL CARBAMATE (E.C.) BY THE L.C.B.O. SINCE 1975

DATE		EVENT
Late	1977	Mr. Clarke, L.C.B.O. Chief Chemist, asked Mr. Karumanchiri, a technician, to see if he could develop a test to determine whether the use of the preservative Diethyl Pyrocarbonate resulted in the production of E.C.
Mid -	1978	Having developed a test method using a gas chromatograph equipped with a packed column, Mr. Karumanchiri knew for the first time that E.C. was present in liquor in Ontario. He advised Mr. Clarke, who instructed him to stop work on the project. Mr. Clarke testified that this was due to other, more pressing, priorities in the lab.
	1980	A Tracor gas chromatograph equipped with a capillary column and a Hall Detector was purchased by the L.C.B.O. lab. Mr. Karumanchiri modified the test method and resumed testing for E.C.
October	1980	Mr. Karumanchiri began recording test results in his laboratory book.
Early	1981	Acting on Mr. Clarke's instructions, Mr. Karumanchiri tried to find an outside laboratory capable of doing confirmatory analyses. Several laboratories were approached but were unable to do the work.
December	1981	Dr. Pierre Beaumier, Vice-President and Chief Chemist of Mann Testing Laboratories, was approached by Mr. Karumanchiri. Dr. Beaumier confirmed that his lab was capable of doing the desired work.

January	1982	Mr. Karumanchiri took prepared samples and a new capillary column to Mann Laboratories.
Feb. 3	1982	The first report of Mann Laboratories was sent, confirming the presence of E.C. in all four of the samples tested.
Prior to Apr. 20	1982	Mr. Clarke, acting on Mr. Karumanchiri's request, obtained a computer printout of toxicological data relating to E.C. from the Library. Mr. Clarke testified that he asked Mr. Karumanchiri to prepare a report to be given to Mr. Couillard, L.C.B.O. Assistant General Manager. Mr. Karumanchiri testified that he prepared the report on his own initiative, as Mr. Clarke had taken no action for two years.
April 15	1982	The second Mann Report was sent, confirming the presence of E.C. in six samples prepared by the L.C.B.O. lab.
April 20	1982	Mr. Karumanchiri delivered a copy of his "Interim Report on the Status of Ethyl Carbamate in Wines and Spirits" to Mr. Couillard. Mr. Karumanchiri testified that he delivered a copy of the report to Mr. Clarke on the same day but Mr. Clarke stated he did not receive a copy of the report until some time in early May.
April 21	1982	Mr. Couillard and Mr. Karumanchiri met and discussed the report and Mr. Couillard said he would discuss the matter with the Chairman.
May 11	1982	Mr. Couillard had a final meeting with Mr. Clarke and Mr. Karumanchiri. Following this, a meeting was held

		in the Chairman's office attended by Mr. Bosworth, Chairman of the L.C.B.O., Mr. Couillard and Mr. Clarke to discuss the problem. Mr. Bosworth then telephoned Mr. Arnold, President of Brights' Winery, to arrange a meeting with representatives from Brights. Mr. Couillard opened the "Project Beta" file in which any material relating to E.C. was kept.
May 12	1982	A meeting was held in the Board Room at the L.C.B.O. attended by Mr. Bosworth, Mr. Clarke and Mr. Couillard and the following representatives of Brights: David Diston, Vice-President; John Ghetti, Viticultural Manager; Hernan Gras, Wine Master; and David Nicol, Quality Control Manager. The Brights people were told to keep the E.C. matter confidential. Mr. Bosworth did not stay for the entire meeting.
May 13	1982	By this time the experts from Brights had determined that urea was the main source of E.C. production.
May 14	1982	Mr. Gras delivered samples of wine prepared with and without urea to the L.C.B.O. lab for analysis.
May 28	1982	More samples from Brights were sent to the L.C.B.O. lab. Mr. Clarke wrote the "Code 99" memo outlining steps to be taken in an effort to resolve the problem.
June	1982	Mr. Clarke wrote a retirement project proposal whereby he would continue to work part-time at the L.C.B.O. in order to first resolve the E.C. problem and subsequently conduct research into other potentially harmful substances in liquor. His rough notes

		were later typed and the language greatly modified, deleting all reference to E.C. per se. The typed version was given to Mr. Couillard, who testified that he gave it to Mr. Bosworth. Mr. Bosworth testified that he did not see a copy of the proposed retirement project and, although he knew Mr. Clarke wished to work part time, he did not know what problems Mr. Clarke wanted to work on.
June 8	1982	Mr. Clarke wrote to Mr. Diston providing him with the estimated cost for E.C. analysis.
June 10	1982	Additional samples were sent from Brights to the L.C.B.O. lab.
June 15	1982	Mr. Diston responded to Mr. Clarke's letter with the suggestion that the portion of the cost of analysis to be borne by Brights should be discussed at a meeting with Mr. Clarke and Mr. Couillard.
June 21	1982	Mr. Clarke sent Mr. Couillard copies of his correspondence with Mr. Diston relating to costs.
June 22	1982	Mr. Bosworth sent Mr. Couillard a memo rejecting Mr. Clarke's proposed retirement project.
Aug. 26	1982	Mr. Clarke sent Mr. Couillard the "polluted wine" memo suggesting producers be informed that the Board would not accept products containing toxic or cancer-producing constituents.
Sept.	1982	By this time, Marguerite Taccogna, a secretary in the L.C.B.O. lab, was aware of the E.C. problem.

Sept. 8	1982	Further samples were sent from Brights to the lab for analysis.
Sept. 17	1982	Mr. Couillard wrote to Mr. Diston stating that Brights would be charged $115 per E.C. analysis. This was never followed up.
Sept. 30	1982	Mr. Clarke retired.
Oct. 1	1982	Mr. Parker was appointed Director of the laboratory. He had not been informed of the E.C. problem by Mr. Clarke.
Nov.	1982	Mr. Karumanchiri told Mr. Parker about the E.C. situation. Mr. Parker outlined possible steps to be taken to resolve this problem. Some time in November, Mr. Clarke was advised by Mr. Couillard that his retirement project proposal had been rejected.
Dec. 16	1982	Additional samples were sent to the L.C.B.O. lab by Mr. Gras, all of which were found to contain less than 10 parts per billion of E.C. Mr. Karumanchiri telephoned Mr. Gras and advised him of this.
Late	1982	Mr. Nicholas Opdam, Director of Oenology for Barnes Wines, was told about the E.C. problem by Mr. Parker. Mr. Parker's recollection was that he informed Mr. Opdam at a later date. Mr. Parker began compiling ledger sheets for each winery, containing the analysis results of each product tested. Mr. Parker and Mr. Couillard had some discussions about the problem. Mr. Couillard testified that he informed Mr. Bosworth periodically

		about developements in the E.C. situation. Mr. Bosworth testified that from the time of the May 12, 1982 meeting until the matter became public in November, 1985, E.C. was never mentioned to him again.
	1983	Mr. Karumanchiri was told by Mr. Parker to test only ports and sherries and to discontinue testing on table wines.
Jan.	1983	Mr. Parker met with Mr. Couillard to discuss the E.C. problem.
Jan. 12	1983	Mr. Parker sent Mr. Couillard a memo, advising him of the test results of the samples submitted by Brights in December. He also suggested that all wineries be advised at the highest management levels that the use of urea could result in the formation of E.C., a known carcinogen. Mr. Couillard did not feel that this was an appropriate time to tell the wineries to stop using urea.
March 24	1983	Mr. Parker sent a memo to Mr. Couillard advising him of the results of testing of Chateau-Gai and London ports and sherries.
April	1983	Mr. Yan, a technician, was transferred out of Mr. Karumanchiri's area of the lab, leaving Mr. Karumanchiri as the sole person doing E.C. analyses.
April 25	1983	Brights submitted a request for listing for Select Dry Sherry.
June 2	1983	London Winery submitted an application for listing for London Dry Sherry.

June 20	1983	Mr. Parker sent Mr. Couillard a memo informing him that the Brights Select Dry Sherry contained 3,790 ppb of E.C. and therefore should not be accepted for listing. Mr. Parker sent Mr. Couillard another memo, advising him of the E.C. levels in Barnes Wines and again indicating that high levels resulted from the use of urea as a yeast food.
June 21	1983	Mr. Couillard drafted a letter to be sent to all wineries, advising them of the discovery of E.C., of its carcinogenicity and that high levels resulted from the use of urea. This letter was never sent. Mr. Couillard discussed the problem of the Brights Select Dry Sherry with Mr. Diston, who indicated that Brights would blend again. Mr. Couillard then sent a memo to Mr. Parker, Mr. Flett, then Director of Product Listings and Control, and Mr. Brady, Director of Product Purchasing, advising them that Brights would be submitting a new sample of Select Dry Sherry.
June 23	1983	Mr. Parker phoned Mr. Patience, the winemaker at London Winery, and was informed that the winery did not use urea.
June 24	1983	Mr. Parker phoned Mr. Jackson, the winemaker at Chateau-Gai and was informed that the winery did not use urea.
June 27	1983	Mr. Parker testified that it was at this time he phoned Mr. Opdam, who had been on vacation the previous week, and advised him not to use urea.
July 20	1983	The London Dry Sherry was accepted for listing.

July 22	1983	Mr. Parker phoned Mr. Poag, the winemaker at Andres Winery and was informed that urea was used in some wines. He also telephoned Mr. Anderson, the Quality Control Co-ordinator at Jordan's and was advised that Jordan's had not used urea since 1979.
July 25	1983	Mr. Parker sent Mr. Couillard a memo advising him that Andres, Barnes, Brights, Chateau-Gai, Jordan and London had been advised not to use urea.
July 28	1983	Mr. Flett advised the London Winery that their Dry Sherry had been approved for listing.
Sept.	1983	Mr. Poag was informed that there was an E.C. problem in some wines, but he was not advised that there was a problem in relation to any of Andres Wines. He was not given any test results.
Sept. 7	1983	The third Mann Report was sent, confirming the presence of E.C. in the six samples sent.
Sept. 28	1983	Mr. Gras sent Mr. Parker a letter outlining the method of production of wines that had been tested.
October	1983	Mr. Parker testified that he contacted Desmond Sing Gen, the Technical Services Co-ordinator at Jordan's to advise him of high levels of E.C. in Jordan's products. Mr. Sing Gen does not recall being contacted until December 23, 1983. Mr. Couillard was not informed of Jordan's high results.
November	1983	Mr. Parker asked Mr. Poag for some samples prepared in various ways which Mr. Poag neglected to give him.

Nov. 7	1983	Mr. Parker sent Mr. Gras a letter with the test results of four samples. He raised questions about possible factors that could affect the E.C. level.
Dec. 14	1983	Mr. Gras wrote to Mr. Parker indicating that Brights would carry out certain tests in order to answer his questions.
Dec. 20	1983	Mr. Parker sent a memo to Mr. Couillard advising him that the E.C. level in a new submission of Jordan's Select Dry Sherry was very high and that the sale of the product should not be permitted.
Dec. 22	1983	Mr. Couillard advised Mr. Rylko, Vice-President of Jordan's, of the problem, and Mr. Rylko agreed to withdraw the Select Sherry from sale.
Dec. 23	1983	Mr. Parker spoke to Mr. Boles, Quality Control Manager at Jordan's, providing him with general information about the E.C. problem. Mr. Parker asked Mr. Boles to provide him with a sample of sherry prepared without urea. Mr. Rylko asked Mr. Sing Gen to obtain information about E.C.
Jan. 3 or 4	1984	A meeting was held at Jordan's attended by Mr. Rylko, Mr. Sing Gen, Mr. Anderson, Mr. Boles, Mr. Zimmerman, National Manager of Wine Production, and Mr. Burke, Operations Manager. The purpose of the meeting was to set up an individual as co-ordinator and to develop an approach to resolving the problem.
Jan. 5	1984	Mr. Rylko had obtained an inventory of all Jordan's stock that might contain E.C.

Jan. 6	1984	Mr. Sing Gen and Mr. Boles met with Mr. Parker at the L.C.B.O. lab. The Jordan's representatives were advised that this was a preliminary investigation into E.C.; that the matter was very confidential; that upper limits would be set possibly at 100 ppb; that Mr. Couillard would be advising the presidents of companies concerned, and that new listings containing an unacceptable level of E.C. would not be permitted. The samples requested by Mr. Parker were delivered.
Jan. 15	1984	Mr. Sing Gen began conducting a literature search, trying to obtain all available information about E.C., and looking for a lab capable of E.C. analysis.
Jan. 17	1984	The fourth Mann Report was sent, confirming the presence of E.C. in all four samples tested.
Feb. 7	1984	Mr. Patience sent Mr. Parker flow sheets outlining the method of preparation of the London Dry Sherry.
Feb. 14	1984	Mr. Knowles, Executive Vice-President of the London winery, wrote to Mr. Couillard, requesting current Liquor Board regulations and stating that Mr. Patience had been informed by Mr. Parker that the Dry Sherry now met with lab approval.
Feb. 20	1984	Mr. Sing Gen received a letter from Diversified Research Laboratories giving him a quotation for Ethyl Carbamate analysis.
Feb/Mar.	1984	Mr. Opdam sent samples to Mr. Parker that had been prepared in various ways. It was Mr. Opdam's understanding

	that this was part of a project to determine if there was a relationship between urea and the formation of E.C.
March 30 1984	Mr. Parker called Mr. Sing Gen and advised him of the test results of the samples provided in January. He requested additional samples prepared in specific ways. Mr. Rylko instructed Mr. Sing Gen not to provide the samples, but instead to concentrate on finding another laboratory capable of E.C. analysis.
April 1984	Brights provided port and sherry samples that had been baked and manufactured without the addition of yeast food. Mr. Parker reached the conclusion that where no yeast food was added, no E.C. would be produced. One hundred cases of Gekkeikan Silver Sake were ordered through private stock on behalf of a Toronto restaurant.
May 3 1984	Mr. Sing Gen provided Mr. Parker with a second sample of one of the products tested earlier, as he had promised to do so on March 30th.
May 15 1984	Mr. Parker sent Mr. Couillard a memo advising him that a new submission of Paul Masson Rare Cream Sherry had a high E.C. level and should be rejected.
May 24 1984	Mr. Couillard sent a memo to Mr. Flett advising him that the Rare Wine Store should not list any brands of North American sherry prior to lab clearance for E.C. content.
June 11 1984	Mr. Parker sent Mr. Flett a memo advising him that Mr. Couillard's

		memo of May 24, 1984, should be amended to include European sherries as a high level of E.C. had been found in a Spanish sherry.
June 20	1984	The Silver Gekkeikan Sake arrived in Toronto.
July 9	1984	The Sake was tested and found to contain E.C. at a level of 161 ppb.
Aug. 1	1984	Mr. Parker indicated that the Sake was not acceptable due to the E.C. content and Mr. Couillard rejected the sample.
Aug. 19	1984	Diversified Research Lab had been unsuccessful in attempting E.C. analysis and advised Mr. Sing Gen that they were unable to obtain reproducible results. Mr. Sing Gen asked them to try to find another laboratory anywhere in Canada or the United States that could do the analysis on a sub-contract basis.
Aug. 20	1984	Mr. Podstatzky, the local agent for the Sake manufacturers, sent the manufacturers a telex advising them that E.C., a carcinogenic, had been found in the Sake.
Aug. 21	1984	The Sake manufacturer, the Okura Shuzo Company sent a telex to the agent advising him that their lab would conduct an E.C. analysis and requesting further information.
Aug. 22	1984	Telexes passed between the manufacturer of the Sake and the Ontario agent which included the actual E.C. analysis results.
Aug. 23	1984	The agent telexed the manufacturer, asking him to send his test results

		directly to Mr. Parker.
Sept. 11	1984	Mr. Gras sent a further series of samples to the L.C.B.O. lab, prepared in various ways. Mr. Parker, apparently unaware that there were a hundred cases of Silver Sake already in Toronto, requested a new sample from Japan. The agent advised the manufacturer of this by telex.
Sept. 22	1984	The Sake manufacturer sent Mr. Parker a letter enclosing a certificate of analysis showing E.C. at less than 5 ppb and indicating three new samples had been sent.
Oct. 28	1984	Two of the Sake samples arrived in Toronto.
October	1984	Mr. Couillard gave Mr. Flett the Beta file and briefed him on the E.C. situation.
Oct. 11	1984	Mr. Parker sent Mr. Grace, the Supervisor of Private Stock, a memo advising him that the Sake now contained E.C. at less than 10 ppb and was acceptable. Mr. Parker also sent a letter to the manufacturer advising him of this.
Oct. 17	1984	The one hundred cases of Sake were released from the warehouse to the restaurant.
Oct. 31	1984	Mr. Couillard retired. He testified that he thought that the E.C. problem was now resolved.
Nov. 1	1984	Mrs. Anne Hartley was appointed Director of Product Administration. Mr. Flett was appointed the Assistant General Manager of the Products Division.

Nov. 19	1984	Mr. Parker had his first discussion with Mr. Flett relating to E.C.
Nov. 21	1984	Mr. Parker sent Mr. Flett a memo indicating that Barnes Canadian Sherry had been analyzed and contained E.C. at a level of 1,351 ppb.
Nov. 27	1984	Mr. Parker wrote to Mr. Opdam advising him of the E.C. level in the Barnes Canadian Sherry. He said that the wine had not been tested earlier and that it should not be sold.
Late November 1984		During a telephone conversation, Mr. Opdam advised Mr. Parker that the Canadian sherry was merely a re-formulation of a product that was already listed. Mr. Parker testified that he told Mr. Opdam he would have to get a ruling from Mr. Flett as to whether or not the product could be sold. Mr. Opdam testified that he was left with the impression from Mr. Parker that as the product was not in fact a new submission it could be sold, but that Mr. Parker may have told him to get a ruling from Mr. Flett. In any event, no ruling from Mr. Flett was obtained and the product was sold in Barnes' Winery Stores.
Feb. 1	1985	Mr. Parker called Mr. Sing Gen and gave him test results for a number of Jordan's listed products. Mr. Parker indicated he was concerned as some of the levels were higher than those from the preceding year. Mr. Sing Gen testified he asked Mr. Parker for a guideline or directive so that he could tell his superiors what an acceptable level of E.C. was. Mr. Parker requested additional samples, prepared with diammonium phosphate, and these were not sent.

Feb. 4	1985	Mr. Sing Gen sent Mr. Rylko a memo outlining the information given to him by Mr. Parker on February 1st. He then had a meeting with Mr. Zimmerman and Mr. Rylko.
Feb. 12	1985	Mr. Opdam sent Mr. Parker a sample of sherry stock for analysis.
Apr/May	1985	Mr. Parker told Mr. Flett that he was unhappy with Jordan's response to the E.C. problem as they had failed to provide him with samples as requested.
May	1985	Mr. Yan resumed work on E.C.
May 28	1985	Mr. Sing Gen and Mr. Zimmerman met with Mr. Parker in Toronto and brought him eleven samples for analysis. Mr. Parker again advised Mr. Zimmerman not to use urea, that diammonium phosphate could present problems and that Yeastex was probably the best yeast food. Mr. Parker and Mr. Zimmerman agreed that a level of 10 ppb was too low. Mr. Parker was unable to indicate what the maximum level of E.C. would be.
June/July	1985	Mr. Parker told Mr. Flett he was not happy with the levels of E.C. in Ontario ports and sherries.
June 7	1985	Barnes applied for listing for Heritage Fine Pale Cream Sherry.
July 3	1985	The Heritage Fine Pale Cream Sherry was accepted for listing at the Interim Listing Committee meeting.
July 17	1985	Mr. Parker phoned Jordan's with the results of the samples delivered in May.

Sept. 4	1985	Mr. Parker indicated the Barnes Heritage Fine Pale Sherry was analytically unacceptable for listing.
Oct. 1	1985	Mr. Parker sent Mrs. Hartley a memo advising her that the level of E.C. in Barnes Heritage Sherry was double any anticipated maximum.
Oct. 3	1985	Mrs. Hartley sent a letter to Mr. Sentek, the Marketing Manager at Barnes, advising him that the Heritage Sherry could not be listed due to its E.C. levels.
Oct. 30	1985	Mr. Parker telephoned Mr. Sing Gen with the E.C. results from the annual winery audit. Mr. Sing Gen told Mr. Parker that Jordan's was going to be having a meeting.
Nov. 1	1985	At a meeting attended by Mr. Flett, Mrs. Hartley, and Mr. Diamant, the L.C.B.O. Director of Import Traffic and Customs, Mr. Parker mentioned E.C.
		Mr. Ackroyd, the Chairman of the L.C.B.O., sent a memo to Mr. Parker requesting that the Executive Directors' Committee be immediately informed of any additives that were found in products that could affect health or safety of people.
Nov. 5	1985	Mr. Karumanchiri and Mr. Parker met with Mr. Flett and discussed the E.C. situation. Mr. Flett reviewed the Beta file. Mr. Karumanchiri and Mr. Parker gave Mr. Flett memos that they had prepared outlining the E.C. situation. Mr. Flett did not read the memos until that evening.

Nov. 6	1985	Mr. Flett met with Mr. Ackroyd and gave him the memos prepared by Mr. Parker and Mr. Karumanchiri. Mr. Ackroyd arranged an immediate meeting with the Minister of Consumer and Commercial Relations, the Honourable Monte Kwinter. Dr. Lesbia Smith, the Senior Medical Consultant in Environmental Health Toxicology, Ontario Ministry of Health, was contacted and she did some immediate research into the possible health risks associated with E.C. with a view to establishing an interim level. Later that day there was a meeting attended by Dr. Smith, Mr. Kwinter, Mr. Ackroyd, Mr. Parker, Mr. Crosbie, the Deputy Minister of Consumer and Commercial Relations, and various representatives from the wineries.
Nov. 7	1985	Dr. Smith presented Mr. Kwinter with a report outlining her findings. Mr. Kwinter made a statement to the Ontario Legislature establishing an interim level for E.C. at 500 ppb and stating that a judicial inquiry would be established. All products containing more than 500 ppb of E.C. were removed from the shelves and the public was advised.
Nov. 20	1985	This Commission was established pursuant to Order-in-Council 2709/85.
		Barbados Rum, bottled by the L.C.B.O., was removed from the shelves for high E.C. content. It was subsequently discovered that in fact this rum was free of E.C. A false positive had been recorded due to the use of a new solvent in the extraction process, which solvent was itself contaminated with E.C.

Dec. 9	1985	Federal guidelines for E.C. were established as follows: table wines 30 ppb; fortified wines 100 ppb; distilled spirits 150 ppb fruit brandies and liqueurs 400 ppb.
Feb. 11	1986	A bottle of the Silver Gekkeikan Sake was provided by the restaurant. This was tested for E.C. twice by the L.C.B.O. and found to contain 203 ppb and 208 ppb.

APPENDIX IV

INTER DEPARTMENT ~~OR STORE~~ CORRESPONDENCE ONLY

Rec'd Nov 8/85 Mr.

Ontario

LIQUOR CONTROL BOARD OF ONTARIO

TO R.J. Flett FROM E.A. Parker DATE November 5, 1985

I have a number of concerns regarding the continued presence of ethyl carbamate (E.C.) in products sold by the L.C.B.O. Before dealing with these concerns, the following is a brief review of the past history before I became Lab Director and the present situation. You may also wish to review your files on this subject to confirm my understanding.

1.) The lab established by experiment in 1980 that E.C. was produced when urea, a yeast nutrient, was reacted with alcohol in the presence of heat. E.C. or its metabolites are suspected carcinogens. Subsequently, it was established and confirmed by outside analyses that E.C. was present in Ontario wines (mainly ports and sherries) in high levels. Section B.02.100, Part b (iv) of the Federal Food and Drug Regulations allows yeast foods.

2.) The presence of E.C. in these products was made known to L.C.B.O. management at the highest level. It was decided by management that the issue should not be raised with Federal authorities or otherwise publicized because of the possible repercussions in the industry.

3.) A plan was subsequently devised whereby the wineries would be advised not to use urea and the lab would monitor the levels of E.C. It was thought that wines containing E.C. would be flushed through the system, in due course. Also, New Products with high levels of E.C. would not be allowed for listing.

4.) In the meantime, with the cooperation of an Ontario winery, further experimentation was conducted for other possible sources of E.C. and this expermentation continues to the present and summarized as follows:

   (a) Diammonium phosphate (another allowed nutrient) was used in the production of wine, and under certain circumstances may enter into a reaction forming E.C.

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Ontario

LIQUOR CONTROL BOARD OF ONTARIO

TO R.J. Flett FROM E.A. Parker DATE November 5, 1985

4.) (b) Experimentation using Yeastex (still another allowed nutrient) does not seem to produce E.C. Further experimentation is continuing.

During our analysis of wines, certain impressions and possibilities (some unsupported by experimental data) are emerging. Carbamate pesticides used on grapes and found in wines may also be forming E.C. E.C. may be a natural occurrence in wine also the chemical reaction that originally formed E.C. with urea may be continuing in the wines in storage.

Concerns

1.) A certain winery still has high levels of E.C. in their products according to recent analysis and the idea that E.C. levels would be soon flushed through the system has met with little success in this case.

2.) E.C. may be continuing to form in these products in storage.

3.) Since I cannot talk freely with Federal authorities about the problem, I do not know what levels if any of E.C. would be acceptable in alcoholic beverages.

4.) E.C. has recently appeared in fruit liquors when previous testing indicated the absence of high levels of E.C. in these products.

5.) I am uncertain that the new upper management is aware of the original problem and that they agree with the original policy to deal with the problem.

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TO R.J. Flett FROM E.A. Parker DATE November 5, 1985

6.) Last but not least are the concerns of the health effects of high levels of E.C. in alcoholic beverages. The health effects may be significant or insignificant when ingested in alcoholic beverage. Some studies suggest that man may have a natural antibody activity against E.C., nevertheless, we should continue our efforts to eliminate E.C. from our products.

E.A. Parker

E.A. Parker,
Director of Laboratory Services.

EAP/mt

Ontario

INTER DEPARTMENT OR STORE CORRESPONDENCE ONLY

LIQUOR CONTROL BOARD OF ONTARIO

TO R.F. Flett FROM A. Karumanchiri DATE November 5, 1985

Ethyl Carbamate contamination was originally detected in 1979. A preliminary survey conducted in 1980 showed widespread contamination.

After a year of inaction on the part of the Chief Chemist, I wrote a letter to Assistant General Manager, Mr. J.K. Couillard.

In a subsequent meeting with Mr. Couillard, I was informed that the Board has decided to give Brights Winery two years to sell their contaminated stock and clean up their product. I was asked to investigate the source of this contamination, with help and cooperation from Brights Winery.

By 1982 we had discovered that excess urea, used as yeast food, could react with alcohol at elevated temperatures (solera process) to produce Ethyl Carbamate. Under similar conditions, I was able to produce Ethyl Carbamate in the Laboratory. I believe there are also other precursors besides urea involved in this problem.

After Mr. Parker became Director, he took charge of this investigation. I had no further contact with any Winery or Distillery. I was also asked to limit my survey to Ports and Sherries, even though the initial survey indicated, widespread contamination of table wines, American Whiskies, and fruit brandies.

The problem persists even today, with no solution in sight. Ethyl Carbamate is a textbook carcinogen. It produced Cancers in all types of animal studies, whether this chemical was injested, injected, inhaled or absorbed through skin. It is used in Cancer research to induce Cancers, to study the effect of various drugs.

The recent Diethylene Glycol scandal, has resulted in increased vigilance on the part of various Government Agencies involved in quality control of alcoholic beverages.

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INTER DEPARTMENT OR STORE CORRESPONDENCE ONLY

Ontario

LIQUOR CONTROL BOARD OF ONTARIO

TO R.J. Flett FROM A. Karumanchiri DATE November 5, 1985

Today, five years after its original discovery Ethyl Carbamate contamination is still severe and widespread. Chromatographic conditions used for the analysis of Ethyl Carbamate and Diethylene Glycol are very similar. In view of these facts, and the severe health hazard it poses, I would strongly recommend, informing and consulting Federal Health Protection Branch, to resolve this problem.

A. Karumanchiri,
Development Scientist.

AK/mt

APPENDIX V

CURRENT AND PROPOSED TESTING BY L.C.B.O. LABORATORY

The attached report, headed Re: Laboratory Testing, was prepared by Mr. Allan Parker and filed as part of Exhibit 147. The report outlines the substances tested for by the L.C.B.O. lab as of May 1986, the type of test performed, the maximum permitted level of the substance where one is specified, and the equipment and laboratory personnel needed to perform the procedure. Mr. Parker has also outlined substances which were tested for in the past but for which testing has been discontinued. Mr. Parker included a proposal for an expansion of testing procedures, including the addition of manpower and equipment which would be necessary to put this into effect.

The report consists of five pages of general information and four tables. Table 1 outlines those tests that have a high impact on the laboratory workload because of the large number of products tested. Mr. Parker outlines the constituents tested and whether the tests are done on wine, beer or spirits in listed products, new submissions to Vintages or to regular listings, and private stock. Table 2 is set up in the same manner as Table 1 and lists additional constituents Mr. Parker feels should be tested and his reasons therefor. Table 3 outlines the tests done on products with a low impact on the laboratory, being blending wines, police samples and shipments for bottling by the L.C.B.O. In both Tables 1 and 3 Mr. Parker explains why certain constitutuents are not tested in particular products. Table 4 is somewhat different, setting out the instrument used, the technician doing the testing and the maximum levels for each constituent pursuant to both L.C.B.O. norms and federal regulations, as well as the constituent and product tested.

Without going into specific details, it

should be noted that for most constituents a maximum level is set pursuant either to L.C.B.O. norms or to Food and Drugs Act regulations. As has already been indicated, L.C.B.O. norms generally relate to quality concerns, and in many cases norms exist for constituents not governed by the regulations, or in some cases the norms are more restrictive than the federal maximum. For example, pursuant to the L.C.B.O. norms the maximum level for copper is 1 ppm, while no maximum is specified under the regulations. There are also instances where a constituent, if found at a sufficiently high level, could pose a health risk, yet no maximum level is specified under the Food and Drugs Act. Potassium Ferrocyanide (cyanide), for instance, has a maximum level of 0.5 ppm according to L.C.B.O. norms, while no maximum is specified in the federal regulations.

Certain tests are conducted even where there is no maximum level of the constituent set. Total sugars are tested in wine, although there is no maximum sugar level, in order to provide the consumer with information as to the sweetness of a particular product. Bottle contents are spot checked to ensure conformance with federal packaging regulations.

At present the L.C.B.O. lab performs numerous tests on a wide range of products. The personnel are knowledgeable and, since the addition of a mass spectrometer in December, 1985, the lab is equipped with some of the finest analytical equipment available. Without commenting on each constituent Mr. Parker proposes should be added to the testing routine, it can be said that in general his proposals are feasible. Mr. Parker and Mr. Wilcox have testified that the L.C.B.O. norms are under review and that input as to the appropriateness of the norms will be sought from, among others, the Federal Health Protection Branch and the industry. Mr. Wilcox further testified that money has been allocated to increase the size of the laboratory, purchase additional equipment and hire more staff. The precise question as to what specific tests should be added to or deleted from the testing regime is now under review.

RE: LABORATORY TESTING

This report contains four tables. Attached to Tables 1, 2 and 3 are comments regarding the testing or not testing.

In all, through tables and the various comments contained therein, the report outlines what we test, the kind of testing performed to what levels, the equipment used and the laboratory technicians involved.

The report also indicates the expansion of tests and testing foreseen in 1986 and the equipment and manpower needed to accomplish this. In addition, the LCBO norms are to be revised in 1986 and this report outlines the major changes expected to be made in this revision.

In testing for levels of constituents covered by Federal Regulations, the Federal Regulations are followed and any LCBO norms are adjusted accordingly to follow the regulations. Exceptions to this are the sorbic acid, volatile acid and sulphur dioxide levels which are lower than Federal Regulations.

1. THE LCBO GUIDELINES NOT COMMENTED UPON IN THE VARIOUS TABLES OF THIS REPORT ARE:

   (a) Hydrogen Sulfide in wines and beer
   (b) Mercury in wines, beers and spirits
   (c) Asbestos in wines, beers and spirits
   (d) Hot and Cold Stability in wines
   (e) Ascorbic acid in beers
   (f) Coumarin

   (a) HYDROGEN SULFIDE

   There are no health implications at levels normally found in wines. Literature indicates difficulty in obtaining reliable results at concentration below sensory levels. Equipment has been identified which may be successful but a cost study vs benefits obtained should be made.

   (b) MERCURY

   This is a very lengthy and difficult analytical method. A brief survey completed in the mid 1970s indicated very low levels were present. It may not be worth the time vs the benefits obtained to do this analysis on a routine basis. After data on the levels of elements such a selenium and antimony has been obtained, a survey of mercury may again be done.

   (c) ASBESTOS

   There is no indication that asbestos used in filters causes health problems or adds to the asbestos concentration in alcoholic beverages. This, in part, was the finding of The Royal Commission on Matters of Health and Safety Arising from the Use of Asbestos in Ontario, Volume 2, page 657.

(d) HOT AND COLD STABILITY IN WINES

After some years of testing for this parameter little information on the stability of wines was obtained and the test was discontinued early in 1985. The analysis of turbidity and the establishment of turbidity standards for wines has replaced this test.

(e) ASCORBIC ACID IN BEERS

Ascorbic acid is used as an anti-oxidant in beers. This compound is not a health hazard and is low on a priority list of perspective testing.

(f) COUMARIN

This substance is not allowed in food (B.01.046. Food and Drug Regs.). Some years ago Coumarin was found in a spirit containing leaves of buffalo grass. It was suspected that the grass was the source of the Coumarin. This product is no longer listed.

2. EXPANSION OF TESTING, PERSONNEL AND EQUIPMENT

(a) DIETHYLENE GLYCOL

(i) Number of samples analyzed in 1985 - 50
(ii) Number of samples anticipated in 1986 - 750
(Italian, German and Austrian wines.)
(iii) New instrumentation required - addition of an autosampler on existing equipment.
(iv) Additional manpower - none. Increased workload can be handled by reorganizing existing staff.

(b) METHANOL

(i) Number of samples analyzed in 1985 - 20
(ii) Number of samples anticipated in 1986 - 600 + ; perhaps 900
(New Submission Vintages wines, fruit liquors; New Submission Listed Products wines, fruit liquors; Private Stock wines, fruit liquors; Listed fruit liquors.)
(iii) New instrumentation required - none
(iv) Additional manpower - Technician 3.

(c) ETHY CARBAMATE

5
(i) Number of samples analyzed in 1986 - 500
(ii) Number of samples anticipated in 1986 - 2,800
(iii) New instrumentation required - 1 autosampler
(iv) Additional manpower - 2 Technicians 3

(d) ALCOHOL

(i) Number of samples analyzed in 1985 - 3,700
(ii) Number of samples anticipated in 1986 - 4,700
(iii) New instrumentation required - none
(iv) Additional manpower - covered in (b)

(e) PESTICIDES - MESUROL, DIAZINON, CARBARYL

(i) Number of samples analyzed in 1985 - 90

(ii) Number of samples anticipated in 1986 - 600

(iii) New instrumentation required - autosampler and recording integrator

(iv) Additional manpower - 1 Technician 3

(f) DIMETHYL PYROCARBONATE

Develop a new procedure to detect illegal use.

(g) EXPANDING ANALYSIS OF PESTICIDE RESIDUES

The detection of 30 pesticides and metabolites is anticipated.

(h) LISTED DOMESTIC SPIRITS

(i) Number of samples analyzed in 1985 - none

(ii) Number of samples anticipated in 1986 - 285

(iii) New instrumentation required - 1 Atomic Absorption + 1 autosampler

(iv) Additional manpower - 1 Technician 2

(i) NEW SUBMISSION VINTAGES

(i) Number of samples analyzed in 1985 - 425

(ii) Number of samples anticipated in 1986 - 660

(iii) New instrumentation required - covered in (h)

(iv) Additional manpower - covered in (h)

(j) PRIVATE STOCK

(i) Number of samples analyzed in 1985 - 125

(ii) Number of samples anticipated in 1986 - 525

(iii) New instrumentation required - covered in (h) plus HPLC detector (U.V., Fluorescence, Conductivity)

(iv) Additional manpower - covered in (h)

(k) MICRO BREWERIES AND BREW PUBS

(i) Number of samples analyzed in 1985 - 10

(ii) Number of samples anticipated in 1986 - 80

(iii) New instrumentation required - covered in (h) and (j)

(iv) Additional manpower - covered in (h)

(l) SILVER, ANTIMONY, SELENIUM SURVEY

(i) Number of samples analyzed in 1985 - none

(ii) Number of samples anticipated in 1986 - 1,500

(iii) New instrumentation required - covered in (h)

(iv) Additional manpower - covered in (h)

(m) FLUORINE, POLYVINYLPYRROLIDONE

Develop methods of analysis

(n) CALCIUM

- (i) Number of samples analyzed in 1985 - none
- (ii) Number of samples anticipated in 1986 - 50
- (iii) New instrumentation required - none
- (iv) Additional manpower - none

(o) SULPHATE

- (i) Number of samples analyzed in 1985 - none
- (ii) Number of samples anticipated in 1986 - 70
- (iii) New instrumentation required - covered in (j)
- (iv) Additional manpower - none

3. MAJOR EQUIPMENT NOT NOTED IN TABLE #4 (already purchased)

EQUIPMENT	USE
Varian Model 8500 - High Pressure Liquid Chromatograph with a Varian UV-50 Variable Wavelength Detector	Quantitate Dyes, non volatile pesticide analysis. Recheck high levels of sorbic acid, general research in the analysis of non volatile compounds
Hewlett/Packard 3353 Lab Automation System	Quantitate analytical result automatically as they are produced by certain instruments. Calculation formulas for dilution of overproof LCBO bottling products to bottling strength.
Beckman Model 24 Spectrometer	Detector used with Autoanalyzer - Unit 2 System

4. CHANGES FORSEEN IN LCBO NORMS

ADDITIONS

- (a) Ethyl Carbamate Guidelines
- (b) Diethyle Glycol Guidelines
- (c) Turbidity Standards for wines
- (d) Revision of Allowed Dyes to Conform to Federal Food and Drug Regulations

CHANGES

(a) Volatile acid to Federal Guidelines

(b) Various Trace Element Norms will probably be altered, particularly Cadmium

(c) The Ethyl alcohol tolerances will be changed for wines - probably ± 1.0% below 14% and ± 0.5% at 14% and above.

(d) Tartaric acid to reflect Federal Food and Drug Regulations.

(e) Nitrosoamines to N-Nitrosodimethylamine and the upper level of 2 ppb will probably be reduced as soon as advice is received from Health Protection.

(f) Coumarin should not be present in spirits or liqueurs and our norms will be revised to reflect this.

DELETIONS

(a) Asbestos

(b) Hot and Cold Stability

(c) Maybe Ascorbic Acid.

TABLE III
FOOD ADDITIVES THAT MAY BE USED AS COLOURING AGENTS

	Item No.	Column I Additive	Column II Permitted in or Upon	Column III Maximum Level of Use
18-10-79 13-5-75	1	Aluminum Metal Alkanet Annatto Anthocyanins Beet Red Canthaxanthin Carbon Black Carotene Charcoal Chlorophyll Cochineal Iron Oxide Orchil Paprika Riboflavin Saffron Saunderswood Silver Metal Titanium Dioxide Turmeric Xanthophyll	(1) Apple (or rhubarb) and (naming the fruit) jam; Bread; Butter; Concentrated fruit juice; Fig marmalade with pectin; Ice cream mix; Ice milk mix; Icing sugar; (naming the fruit) Jam with pectin; (naming the fruit) Jelly with pectin; Liqueurs and alcoholic cordials; (naming the flavour) milk; Pickles and relishes; Pineapple marmalade with pectin; Sherbet; (naming the flavour) Skim milk; (naming the flavour) Partly skimmed milk; (naming the flavour) Skim milk with added milk solids; (naming the flavour) Partly skimmed milk with added milk solids; Smoked fish; Lobster paste and fish roe (caviar); Tomato catsup; Marinated or similar cold processed, packaged fish and meat (Division 21)	(1) Good Manufacturing Practice
28-4-74			(2) Liquid, dried or frozen whole egg; Liquid, dried or frozen egg yolk	(2) Good Manufacturing Practice in accordance with paragraphs B.22.034(b) and B.22.035(b)
			(3) Unstandardized foods	(3) Good Manufacturing Practice
			(4) Vegetable fats and oils	(4) Good Manufacturing Practice in accordance with section B.09.001
17-11-77			(5) Margarine	(5) Good Manufacturing Practice in accordance with subparagraph B.09.016(c)(vi)
18-10-79 10-6-82			(6) (named variety) Cheese; Cheddar cheese; Cream cheese with (named added ingredients); Cream cheese spread; Cream cheese spread with (named added ingredients); Processed (named variety) cheese; Processed (named variety) cheese with (named added ingredients); Processed cheese food; Processed cheese food with (named added ingredients; Processed cheese spread; Processed cheese spread with (named added ingredients); Cold-pack (named variety) cheese; Cold-pack (named variety) cheese with (named added ingredients); Cold-pack cheese food; Cold-pack cheese food with (named added ingredients)	(6) Good Manufacturing Practice in accordance with the requirements of sections B.08.033, B.08.034, B.08.037, B.08.038, B.08.039, B.08.040, B.08.041, B.08.041.1, B.08.041.2, B.08.041.3, B.08.041.4, B.08.041.5, B.08.041.6, B.08.041.7 and B.08.041.8

*(R) Minor correction

TABLE III -- (Concluded)

	Item No.	Column I Additive	Column II Permitted in or Upon	Column III Maximum Level of Use
25-7-84	1	(Continued)	(7) A blend of prepared fish and prepared meat referred to in paragraph B.21.006(n)	(7) Good Manufacturing Practice
18-10-79 17-11-77	1A.	B-apo-8'-Carotenal Ethyl B-apo-8'-carotenoate	(1) Apple (or rhubarb) and (naming the fruit) jam; Bread; Butter; Concentrated fruit juice; fig marmalade with pectin; Ice cream mix; Ice milk mix; Icing sugar; (naming the fruit) Jam with pectin; (naming the fruit) Jelly with pectin; Liqueurs and alcoholic cordials; Margarine; (naming the flavour) Milk; Pickles and relishes; Pineapple marmalade with pectin; Sherbet; (naming the flavour) Skim milk; (naming the flavour) Partly skimmed milk; (naming the flavour) Skim milk with added milk solids; (naming the flavour) Partly skimmed milk with added milk solids; Smoked fish; Lobster paste and fish roe (caviar); Tomato catsup	(1) 35 p.p.m.
			(2) Unstandardized foods	(2) 35 p.p.m.
13-5-75			(3) (named variety) Cheese; Cheddar cheese; Cream cheese with (named added ingredients); Cream cheese spread; Cream cheese spread with (named added ingredients); Processed (named variety) cheese; Processed (named variety) cheese with (named added ingredients); Processed cheese food, Processed cheese food with (named added ingredients); Processed cheese spread; Processed cheese spread with (named added ingredients); Cold-pack (named variety) cheese; Cold-pack (named variety) cheese with (named added ingredients); Cold-pack cheese food; Cold-pack cheese food with (named added ingredients)	(3) 35 p.p.m., in accordance with the requirements of sections B.08.033, B.08.034, B.08.037, B.08.038, B.08.039, B.08.040, B.08.041, B.08.041.1, B.08.041.2, B.08.041.3, B.08.041.4, B.08.041.5, B.08.041.6, B.08.041.7 and B.08.041.8
25-7-84			(4) A blend of prepared fish and prepared meat referred to in paragraph B.21.006(n)	(4) 35 p.p.m.

TABLE III — (Concluded)

18-10-79

25-8-76

25-7-84

Item No.	Column I Additive	Column II Permitted in or Upon	Column III Maximum Level of Use
2	Caramel	(1) Ale; Apple (or rhubarb) and (naming the fruit) Jam; Beer; Brandy; Bread; Brown bread; Butter; Cider; Cider vinegar; Concentrated fruit juice; Fig marmalade with pectin; Hollands Gin; Ice cream mix; Ice milk mix; Icing sugar; (naming the fruit) Jam with pectin; (naming the fruit) Jelly with pectin; Light Beer; Liqueurs and alcoholic cordials; Malt liquor; Malt vinegar; (naming the flavour) Milk; Mince meat; Pickles and relishes; Pineapple marmalade with pectin; Porter; Rum; Sherbet; (naming the flavour) Skim milk; (naming the flavour) Partly skimmed milk; (naming the flavour) Skim milk with added milk solids; (naming the flavour) Parly skimmed milk with added milk solids; Smoked fish; Lobster paste and Fish roe (caviar); Stout; Tomato catsup; Whisky; Wine; Wine vinegar; Honey wine	(1) Good Manufacturing Practice
		(2) Unstandardized foods	(2) Good Manufacturing Practice
		(3) A blend of prepared fish and prepared meat referred to in paragraph B.21.006(n)	(3) Good Manufacturing Practice

TABLE III — (Concluded)

	Item No.	Column I Additive	Column II Permitted in or Upon	Column III Maximum Level of Use
7-6-84 18-10-79 13-5-75	3	Allura Red Amaranth Erythrosine Indigotine Sunset Yellow FCF Tartrazine	(1) Apple (or rhubarb) and (naming the fruit) jam; Bread; Butter; Concentrated fruit juice; Fig marmalade with pectin; Ice cream mix; Ice milk mix; Icing sugar; (naming the fruit) Jam with pectin; (naming the fruit) Jelly with pectin; Liqueurs and alcoholic cordials; (naming the flavour) Milk; Pickles and relishes; Pineapple marmalade with pectin; Sherbet; (naming the flavour) Skim milk; (naming the flavour) Partly skimmed milk; (naming the flavour) Skim milk with added milk solids; (naming the flavour) Partly skimmed milk with added milk solids; Smoked fish; Lobster paste and fish roe (caviar); Tomato catsup	(1) 300 p.p.m. singly or in combination in accordance with Section B.06.002.
26-6-80			(2) Unstandardized foods	(2) 300 p.p.m. singly or in combination in accordance with Section B.06.002.
25-7-84			(3) A blend of prepared fish and prepared meat referred to in paragraph B.21.006(n)	(3) 300 p.p.m. singly or in combination in accordance with Section B.06.002.

TABLE III -- (Concluded)

	Item No.	Column I Additive	Column II Permitted in or Upon	Column III Maximum Level of Use
13-5-75 18-10-79	4	Brilliant Blue FCF Fast Green FCF	(1) Apple (or rhubarb) and (naming the fruit) Jam; Bread; Butter; Concentrated fruit juice; Fig marmalade with pectin; Ice cream mix; Ice milk mix; Icing sugar; (naming the fruit) Jam with pectin; (naming the fruit) Jelly with pectin; Liqueurs and alcoholic cordials; (naming the flavour) Milk; Pickles and relishes; Pineapple marmalade with pectin; Sherbet; (naming the flavour) Skim milk; (naming the flavour) Partly skimmed milk; (naming the flavour) Skim milk with added milk solids; (naming the flavour) Partly skimmed milk with added milk solids; Smoked fish; Lobster paste and fish roe (caviar); Tomato catsup	(1) 100 p.p.m. singly or in combination in accordance with Section B.06.002.
26-6-80			(2) Unstandardized foods	(2) 100 p.p.m. singly or in combination in accordance with Section B.06.002.
25-7-84			(3) A blend of prepared fish and prepared meat referred to in paragraph B.21.006(n)	(3) 100 p.p.m. singly or in combination in accordance with Section B.06.002.
	5	Citrus Red No. 2	Skins of whole oranges	2 p.p.m.
28-9-67	6	Ponceau SX	Fruit Peel; Glacé fruits; Maraschino cherries	150 p.p.m.

Laboratory Analytical Procedures

TABLE #1

Table 1 as attached, illustrates the tests done on products with a high impact on laboratory (many samples and a large number of tests done on each). A plus sign indicates that the constituent is tested for, whereas a minus sign indicates that the constituent is not tasted on the products outlined.

Justification For Minus Sign (not testing) On Products Indicated

(a) Total Sugars

(i) Spirits - Listed Products (L.P.), New Submission Vintages (N.S.V.) and New Submission Listed Products (N.S.L.P.), Private Stock (P.S.).

Not required for Price Book information.

The test for Extract will cover the 2.5% requirement for sugars in B02.060 Federal Regulation for liqueurs and alcoholic cordials. Sugar in wines are determined for information purposes only. There are no LCBO norms or Federal Regulations.

(b) Total Acids

(i) Wine - N.S.V.

(ii) Beer - L.P., N.S.V., N.S.L.P., P.S.

(iii) Spirits - as in (ii).

No Federal Regulation. No LCBO norms for beer or spirit. The norms for a wine are an indication of quality. The quality of Vintages, as far as total acids are concerned, is assumed.

(c) Volatile Acids

(i) Spirits - L.P.

No LCBO norms or Federal Regulations for this constituent in spirits.

(d) Tannins

(i) Wine - N.S.V.

(ii) Beer - L.P., N.S.V., N.S.L.P., P.S.

(iii) Spirits - L.P., N.S.V., N.S.L.P., P.S.

No LCBO norms on Federal Regulations. An indication and a contributor to the quality of wines, particularly red wines. The quality of Vintages wines is assumed. Tannins are not an applicable test to beer or spirits.

(e) Free and Total SO_2

(i) Spirits - L.P., N.S.V., N.S.L.P., P.S.

Not applicable to spirits since it is used as an antiseptic for wine micro-organisms that do not propogate in spirits.

(f) Bottle Contents

(i) Wine - N.S.V.
(ii) Beer - N.S.L.P.
(iii) Spirits - P.S.

Listed products are spot checked for fill to conform to Federal Labelling and Packaging Regulations. New Submission Listed Products are spot checked when they are accepted to become part of the regular listing. New submission Vintages are tasted before receipt in the laboratory and the contents cannot be easily measured. Private Stock products are not measured for fill.

(g) Tartaric Acid

(i) Beer - L.P., N.S.V.
(ii) Spirits - N.S.L.P., P.S.

Tartaric acid is not a constituent of beer or distilled products therefore no regulations or testing is required.

(h) pH

(i) Spirits - L.P., N.S.V., N.S.L.P., P.S.

Not a quality parameter nor are limits specified.

(i) Dye

(i) Beer - L.P., N.S.V., N.S.L.P., P.S.

Dyes are not a likely additive to beers when caramel is an allowed colourant.

(j) Turbidity

(i) Wine - N.S.V.
(ii) Beer - N.S.V.
(iii) Spirits - L.P., N.S.V., N.S.L.P., P.S.

Some turbidity is normal with Vintage wines and beers. If the turbidity standards on Listed Products were applied to Vintages, most would fail because of the type of product and the treatment received.

Turbidity standards have not been established for spirits. Turbidity is a quality parameter.

(k) Sediment

As explained in (j) Turbidity.

(l) Arsenic

(i) Spirits - L.P., N.S.V., N.S.L.P., P.S.

Inorganic arsenic compounds are unlikely to be present in spirit distillates. Organic arsenic compounds may be present at very low levels. Until recently (August 1985) we did not have an instrument or technique capable to determining arsenic in high alcohol spirits.

(m) Potassium Ferrocyanide

(i) Beer - L.P., N.S.V., N.S.L.P., P.S.

(ii) Spirits - L.P., N.S.V., N.S.L.P., P.S.

This compound is used to remove excess iron and copper that may cause iron and copper casse in wines. There is no reason for the use of this compound in beer or spirits.

(n) Sodium

(i) Spirits - L.P., N.S.V., N.S.L.P., P.S.

Sodium is not normally found in spirit distillates or dilution water used to bring spirits to bottling strength.

(o) Sorbic Acid

(i) Beer - L.P., N.S.V., N.S.L.P., P.S.

(ii) Spirits - L.P., N.S.V., N.S.L.P., P.S.

Sorbic acid is not an approved antiseptic in beers. There are no reasons for its presence in spirits.

(p) Extract

(i) Wine - L.P., N.S.V., N.S.L.P., P.S.

Extract in wine is not determined unless falsification is suspected.

(q) Methanol

(i) Wine - L.P., N.S.V., N.S.L.P., P.S.

(ii) Beer - L.P., N.S.V., N.S.L.P., P.S.

Methanol in wine and beer is not determined unless falsification is suspected.

(r) N-nitrosodimethylamine

(i) Wine - L.P., N.S.V., N.S.L.P., P.S.

(ii) Beer - L.P.

(iii) Spirits - L.P.

N-nitrosodimethylamine was produced in the malting process therefore not likely to be present in wines. The malting process has been changed and nitrosamines have not been found in listed beer products over several years of testing.

Scotches are another likely source but again none has been found over several years of testing.

(s) Gas Pressure

(i) Wine - N.S.V.

(ii) Beer - N.S.V.

(iii) Spirits - L.P., N.S.V., N.S.L.P., P.S.

Gas pressure tested on petillant wines and beers in unopened bottles. Samples of Vintages products have been opened and tasted prior to receipt in the laboratory. Samples tested to assure CO_2 is present but not in excess.

(t) Ethyl Carbamate

(i) Beer - L.P., N.S.V., N.S.L.P., P.S.

Ethyl Carbamate is not likely to be present. Also, there are no Federal Guidelines for beer.

(u) Diethylene Glycol

(i) Beer - L.P., N.S.V., N.S.L.P., P.S.

(ii) Spirits - L.P., N.S.V., N.S.L.P. P.S.

Diethylene Glycol is unlikely to be present in beer and spirits. It was used to upgrade wines.

TABLE 1 PRESENT TESTS ON PRODUCTS WITH A HIGH IMPACT ON THE LABORATORY, + = CONSTITUENT TESTED, - = CONSTITUENT NOT TESTED

	LISTED PRODUCTS			NEW SUBMISSION-VINTAGES			NEW SUBMISSION-LISTED PRODUCTS			PRIVATE STOCK		
CONSTITUENTS TESTED	WINE	BEER	SPIRITS	WINE	BEER	SPIRITS	WINE	BEER	SPIRITS	WINE	BEER	SPIRITS
Total Sugars	+	+	-	+	+	-	+	+	-	+	+	-
Total Acids	+	-	-	-	-	-	+	-	-	+	-	-
Volatile Acids	+	+	-	+	+	-	+	+	-	+	+	-
Tannins	+	-	-	-	-	-	+	-	-	+	-	-
Free SO_2 - Table Wines	+	+	-	+	+	-	+	+	-	+	+	-
Total SO_2 -Table Wines	+	+	-	+	+	-	+	+	-	+	+	-
Alcohol % / Vol.	+	+	+	+	+	+	+	+	+	+	+	+
Bottle Contents	+	+	+	-	-	-	-	-	-	-	-	-
Tartaric Acid	+	-	-	+	-	-	+	-	-	+	-	-
pH (Red, Rose Wines,	+	+	-	+	+	-	+	+	-	+	+	-
Dye Colored Spirits)	+	-	+	+	-	+	+	-	+	+	-	+
Turbidity	+	+	-	-	-	-	+	+	-	+	+	-
Sediment	+	+	-	-	-	-	+	+	-	+	+	-
Arsenic	+	+	-	+	+	-	+	+	-	+	+	-
Potassium Ferrocyanide	+	-	-	+	-	-	+	-	-	+	-	-
Copper	+	+	+	+	+	+	+	+	+	+	+	+
Lead	+	+	+	+	+	+	+	+	+	+	+	+
Cadmium	+	+	+	+	+	+	+	+	+	+	+	+
Cobalt	+	+	+	+	+	+	+	+	+	+	+	+
Zinc	+	+	+	+	+	+	+	+	+	+	+	+
Iron	+	+	+	+	+	+	+	+	+	+	+	+
Sodium	+	+	-	+	+	-	+	+	-	+	+	-
Sorbic Acid	+	-	-	+	-	-	+	-	-	+	-	-
Extract	-	+	+	-	+	+	-	+	+	-	+	+
Methanol	-	-	+	-	-	+	-	-	+	-	-	+
Nitrosamines (N-Nitrosodimethyamine)	-	-	-	-	+	+	-	+	+	-	+	+
Gas Pressure	+	+	-	-	-	-	+	+	-	+	+	-
Ethyl Carbamate	+	-	+	+	-	+	+	-	+	+	-	+
Diethylene Glycol	+	-	-	+	-	-	+	-	-	+	-	-

TABLE #2

Table 2, as attached, is a summary of proposed testing. These are tests for substances in the Federal Regulations or part of LCBO norms and not, for the most part, previously tested.

Justification For Testing

(a) Sulphates

This constituent is part of the Federal Food and Drug Regulations. Calcium sulphate is a likely addition only to sherries, therefore a survey of sulphate levels is proposed for sherries. Previous analysis circa the 1960's indicated low levels of soluble sulphates in sherries.

(b) Calcium

Federal regulation specify that calcium carbonate should not be added in such a quantity to reduce the tartaric acid level to below 0.15 gm/ 100 mL. for calcium.

(c) Silver

A toxic element part of LCBO norms and not tested. Not likely found in distilled products but this will depend on the levels found in wine and beer. Procedure to be developed and a 10 week survey of levels in wines and beers conducted.

(d) Fluorine

A toxic element part of LCBO norms and not tested. Not likely found in distilled products but this will depend on the levels found in wine and beer. Procedure to be developed and a 10 week survey of levels in wines and beers conducted.

(e) Antimony

A toxic element part of LCBO norms and not tested. Not likely found in distilled products but this will depend on the levels found in wine and beer. Procedure to be developed and a 10 week survey of levels in wines and beers conducted.

(f) Selenium

A toxic element part of LCBO norms and not tested. Not likely found in distilled products but this will depend on the levels found in wine and beer. Procedure to be developed and a 10 week survey of levels in wines and beers conducted.

(g) Polyvinylpyrolidone

Limits are imposed by Federal Regulations for wine and not previously tested. Procedure to be developed.

(h) Pesticides

Limits are imposed by Federal REgulations. Proposed testing for mesurol, diazinon and carbaryl with later expansion to other pesticides.

(i) Dimethyl Pyrocarbonate

Developing a new procedure to detect the illegal use of this perservative.

(j) Dyes

Develop a liquid chromatographic method to quantitate approved dyes used in spirits per Federal Regulation Dyes are illegal in wines.

(k) Methanol

Proposed analysis of New Submission, Vintages wines, New Submission Regular Listing wines and Private Stock wines in addition to the test outlined on Table 4 for spirits. Based on the testing of Italian wines in which all were below guidelines, the assumption is made that Listed Products are below Federal Guidelines. New Federal Guidelines for wines are 0.35% vol. there are apparently no guidelines for spirits.

TABLE 2 SUMMARY OF PROPOSED TESTS ON PRODUCTS, + = CONSTITUENT TESTED, - = CONSTITUENT NOT TESTED

PROPOSED ADDITIONAL	LISTED PRODUCTS			NEW SUBMISSION-VINTAGES			NEW SUBMISSION-LISTED PRODUCTS			PRIVATE STOCK		
CONSTITUENTS TO BE TESTED	WINE	BEER	SPIRITS	WINE	BEER	SPIRITS	WINE	BEER	SPIRITS	WINE	BEER	SPIRITS
Sulphate	+	-	-	+	-	-	+	-	-	+	-	-
Calcium	+	-	-	+	-	-	+	-	-	+	-	-
Silver	+	+	-	+	+	-	+	+	-	+	+	-
Fluorine	+	+	-	+	+	-	+	+	-	+	+	-
Antimony	+	+	-	+	+	-	+	+	-	+	+	-
Selenium	+	+	-	+	+	-	+	+	-	+	+	-
Polyvinylpyrrolidone	+	-	-	+	-	-	+	-	-	+	-	-
Pesticides	+	+	-	+	+	-	+	+	-	+	+	-
Dimethyl Pyrocarbonate	+	-	-	+	-	-	+	-	-	+	-	-
Dyes (Quantitation)	-	-	+	-	-	+	-	-	+	-	-	+
Methanol	-	-	-	+	-	-	+	-	-	+	-	-

TABLE # 3

Table 3, as attached, is a summary of samples tested in the laboratory with a medium to low impact on the testing facilities.

Justification For Not Testing Constituents

(a) Wines For Blending

At the time an analytical sceme was set up, it was thought that alcohol, volatile acid, total acid and sugars were enough quality control and analytical parameters to establish that products were the same when shipped to the winery under the same order number. This may be so, but ethyl carbamate will now be added to the analysis for sherries or ports used for blending.

(b) Police Samples

For the most part, police are only interested in the alcohol content of the sample.

(c) Shipment For LCBO Bottling (Fortified Wines)

Generally conforms to the analysis of a fortified wine in that SO_2 and sorbic acids are not done.

(d) Shipments For LCBO Bottling (Spirits)

Generally conforms to listed spirit analysis except fusel oils are [illegible] determined.

TABLE #3 PRESENTS TESTS ON PRODUCTS WITH A LOW IMPACT ON THE LABORATORY

CONSTITUENT TESTED	WINES FOR BLENDING	POLICE SAMPLES	SHIPMENTS FOR LCBO BOTTLING WINE	SHIPMENTS FOR LCBO BOTTLING SPIRITS
TOTAL SUGARS	+	-	+	-
TOTAL ACIDS	+	-	+	-
VOLATILE ACIDS	+	-	+	-
TANNINS	-	-	+	-
FREE SO_2	-	-	-	-
TOTAL SO_2	-	-	-	-
ALCOHOL %/VOL.	+	+	+	+
BOTTLE CONTENTS	-	-	-	-
TARTARIC ACID	-	-	+	-
pH	-	-	+	-
DYE (RED, ROSE WINES, COLOURED SPIRITS)	-	-	-	-
TURBIDITY	-	-	+	+
SEDIMENT	-	-	+	+
ARSENIC	-	-	+	-
POTASSIUM FERROCYANIDE	-	-	+	-
COPPER	-	-	+	+
LEAD	-	-	+	+
CADMIUM	-	-	+	+
COBALT	-	-	+	+
ZINC	-	-	+	+
IRON	-	-	+	+
SODIUM	-	-	+	-
SORBIC ACID	-	-	-	-
EXTRACT	-	-	-	-
NITROSOAMINES	-	-	-	-
GAS PRESSURE	-	-	-	-
ETHYL CARBAMATE	+	-	+	+
DIETHYLENE GLYCOL	-	-	-	-
FUSEL OILS	-	-	-	+

LEGEND

+ CONSTITUTENT TESTED

- CONSTITUENT NOT TESTED

TABLE #4

TESTS DONE USING INSTRUMENTS BY TECHNICIANS TO OUTLINED STANDARDS

TABLE 4 TESTS DONE USING INSTRUMENTS BY TECHNICIANS TO OUTLINED STANDARDS

				MAXIMUM LEVELS	
TEST	INSTRUMENT	PRODUCT TESTED	TECHNICIAN	LCBO NORMS	FEDERAL REGULATIONS
Total Sugars	Auto Analyzer Unit #1	Wines	Ng	None	None Specified
		Beers	Ng		
Total Acids	Auto Analyzer Unit #1	Wines	Ng	0.45 g/100 mL (lower Limit)	None Specified
Volatile Acids	Auto Analyzer Unit #1	Wines	Ng	0.1040 g/100 mL	0.13 g/100 mL
		Beers	Ng	None	None Specified
Tannins		Wines	Ng	None	None Specified
Sulphur Dioxide - Federal					
Free	Auto Analyzer Unit #1	Wines	Ng	See Below	70 ppm
Total	Auto Analyzer Unit #1	Wines	Ng	See Below	350 ppm
Free	Auto Analyzer Unit #1	Beers	Ng	None	Not Specified
Total	Auto Analyzer Unit #1	Beers	Ng	None	15 ppm
Sulphur Dioxide -LCBO Norms					
Free	Auto Analyzer Unit #1	Wines-dry White	Ng	50 ppm	-
Total	Auto Analyzer Unit #1	Wines-dry White	Ng	200 ppm	-
Free	Auto Analyzer Unit #1	Wines-dry Red	Ng	40 ppm	-
Total	Auto Analyzer Unit #1	Wines-dry Red	Ng	200 ppm	-
Free	Auto Analyzer Unit #1	Sweet White	Ng	70 ppm	-
Total	Auto Analyzer Unit #1	Sweet Red	Ng	350 ppm	-
Alcohol %/Vol.	Hewlett-Packard 5700A Gas Chromatograph Unit 1-H-P7671A Auto-Sampler	Wines	Maxwell	±0.5% maximum variation-from declared	None Specified in F & D Regs
		Beers	Maxwell	None Specified - but-manufacturer notified if over ±0.3% maxmium variation from declared	None Specified in F & D Regs
	Distillation/Density Meter Paar MDA 55	Spirits	Moffatt	None Specified but manufacturer notified if over ±0.2% maximum variation from declared	None Specified
				Lower Limit of 23% - alc./vol. Cordials/Liqueurs	Lower Limit of 23% alc./vol. Cordials/Liqueurs

TABLE 4 TESTS DONE USING INSTRUMENTS BY TECHNICIANS TO OUTLINED STANDARDS

TEST	INSTRUMENT	PRODUCT TESTED	TECHNICIAN	MAXIMUM LEVELS	
				LCBO NORMS	FEDERAL REGULATIONS
Bottle Contents	None	Wines Spot Checked Beers - Spot Checked Spirits - Spot Checked	Moffatt	None Specified But follow tolerances as Per Federal Packaging Reg.	Packaging Regulations
Tartaric Acid	Varian 5000 Liquid Chromatograph + Auto-Analyzer - Unit #2	Wines	Moffatt-Green*	0.15 g/100 mL -lower limit	0.15 g/ 100 mL - lower limits if CA CO_3 has been used
pH	pH meter	Wines	Moffatt-Green	Good manufacturing practice	None Specified
		Beers	Moffatt-Green	None	None Specified
Dyes	No instrument-colour fixed to wool and extracted from the wool, concentrated and determined by thin layer Chromatography. A qualitative test. Allowed Dyes are not quantitated	Wines- Red	Moffatt-Green	No Dyes Allowed	No Dyes Allowed
		Wines-Rose	Moffatt-Green	No Dyes Allowed	No Dyes Allowed
		Spirits-Coloured	Moffatt-Green	Amaranth-300 ppm Erythrosine-300 ppm Tartrazene - 300 ppm Sunset Yellow - 300 ppm Indigotine - 300 ppm Not to Exceed 300 ppm in any combination. Fast Green - 100 ppm Brilliant Blue - 100 ppm Not to Exceed 100 ppm in any combination Donceaux - 150 ppm (Carmel is allowed in spirits wines and beers although not specified.)	See Food and Drug Regulations Table III attached
Turbidity	Hatch Turbidimeter	Wines-White	Lockhart	None Specified	None Specified
		Wines-Rose	Lockhart	None Specified	None Specified
		Wines-Red	Lockhart	None Specified (But see below)	None Specified

TABLE 4 TESTS DONE USING INSTRUMENTS BY TECHNICIANS TO OUTLINED STANDARDS

TEST	INSTRUMENT	PRODUCT TESTED	TECHNICIAN	MAXIMUM LEVELS	
				LCBO NORMS	FEDERAL REGULATIONS
Sediment	Microscope-Centrifuge	Wines- for type of Sediment	Moffatt	Red wines over 1.30 - Nephelometric Turbidity Unit (NTU) Rose wines over 1.00 NTU White wines over 1.00 NTU	
Arsenic	Atomic Absorption Unit #1 (Varian Spectra AA-30 PSC-56 Sample Changer GTA-96 Graphite Tube Atomizer)	Wines	Tsang	0.2 ppm	0.2 ppm
		Beers	Tsang	0.2 ppm	Not Specified
Potassium Ferrocyanide	Auto Analyzer Unit #2	Wines	Lockhart-Green	0.5 ppm	Not Specified
Copper	Atomic Absorption Unit #1	Wines	Tsang	1 ppm	Not Specified
		Beers	Tsang	1 ppm	Not Specified
		Spirits	Tsang	1 ppm	Not Specified
Lead	Atomic Absorption Unit #1	Wines	Tsang	0.4 ppm	0.5 ppm
		Beers	Tsang	0.4 ppm	Not Specified
		Spirits	Tsang	0.4 ppm	Not Specified
Cadmium	Atomic Absorption Unit #1	Wines	Tsang	0.5 ppm	None Specified
		Beers	Tsang	0.5 ppm	None Specified
		Spirits	Tsang	0.5 ppm	None Specified
Cobalt	Atomic Absorption Unit #1	Wines	Tsang	0.02 ppm	None Specified
		Beers	Tsang	0.02 ppm	None Specified
		Spirits	Tsang	0.02 ppm	None Specified
Zinc	Atomic Absorption Unit #2 (Varian AA5 + Auto Analyzer Sample and Pump)	Wines	Lockhart	5 ppm	None Specified
		Beer	Lockhart	5 ppm	None Specified
		Spirits	Lockhart	5 ppm	None Specified
Iron	Atomic Absorption Unit #1	Wines-white	Tsang	15 ppm	None Specified
		Wines-Red	Tsang	20 ppm	None Specified
		Beers	Tsang	None	None Specified
		Spirits	Tsang	G.M.P.	None Specified

TABLE 4 TESTS DONE USING INSTRUMENTS BY TECHNICIANS TO OUTLINED STANDARDS

TEST	INSTRUMENT	PRODUCT TESTED	TECHNICIAN	MAXIMUM LEVELS	
				LCBO NORMS	FEDERAL REGULATIONS
Sodium	Atomic Absorption Unit #2	Wines Beers	Lockhart Lochart	500 ppm None	None Specified None Specified
Sorbic Acid	Autoanalyzer Unit #2	Wines	Lockhart - Green	200 ppm - 500 ppm on - low alcohol sweet wines and Bag-in-a-Box wines.)	500 ppm
Extract	Manual Method	Beers Spirits - containing sugars	Moffatt Moffatt	None None except for liqueurs and cordials as per Federal Regulations	None Specified None Specified except liqueurs and cordials than 2.5% of the finished product
Methanol	Gas Chromatograph Unit #1	Spirits - Fruit Spirits Wines	Maxwell Maxwell	0.35% maximum 0.35% maximum	None Specified 0.35% maximum
Nitrosamines - N-Nitrosodimethylamine	Gas Chromatograph - Unit #2 Hall Detector	Beers	Karumanchiri Yan	2 parts per billion maximum	None Specified
Gas Pressure	Pressure Gauge	Wines-Petillant Beers- all except Draft	Moffatt Moffatt	None None	None Specified None Specified
Ethyl Carbamate	Gas chromatograph-Unit 2 Gas Chromatograph-Unit 3 for confirmation-Hewlett Packard 5890 Gas Chromatograph and 5970 Series Mass Selective Detector.	Wines	Karumanchiri Yan	As per Federal Guidelines	Table Wines - 30 ppb Sakes - 100 ppb Fortified Wines 100 ppb Spirits - 150 ppb Fruit Spirits - 400 ppb
		Spirits	Karumanchiri Yan		
Diethylene Glycol	Gas Chromatograph Unit #4 Varian 6000-Vista	Wines from- Austria, Germany Italy	Karumanchiri	10 ppm maximum 10 ppm maximum 10 ppm maximum	10 ppm maximum 10 ppm maximum 10 ppm maximum

*Green is on
Maternity Leave,
Moffatt or Lockhart
are covering.

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